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Original Communications.

BLOOD CHANGES PRODUCED BY ETHER ANESTHESIA IN BOTH MAN AND LOWER ANIMALS.

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The effects produced upon the blood by the inhalation of ether as an anesthetic are of special importance, since they have a direct bearing upon both surgery and general medicine. The results of the investigations into this subject have served, in a measure at least, as a guide to the selection of an appropriate anesthetic—*i.e.*, whether ether, chloroform, or nitrous oxide should be used in given cases. The effects of the usual anesthetics upon the kidneys, heart, and lungs have received much attention, but records appear to be few wherein the influence which they exert upon the circulating blood is presented. In our series of investigations we have selected normal human subjects, and persons upon whom slight operations were performed, and have also employed rabbits, noting the changes produced in the blood in all cases as a result of ether anesthesia.

In a previous article one of us (Anders[1]) reported a series of experi-

[1] "Jaundice, with reports of interesting illustrative cases—a contribution to the toxic forms of this condition." *American Journal of the Medical Sciences*, April, 1903.

ments made upon two healthy female rabbits and a healthy human subject, without the usual previous preparation for the anesthetic.

The results of those earlier experiments showed clearly that "the fall in the hemoglobin in primary anesthesia reaches its lowest level about twenty-four hours after the termination of the anesthetic state; also that one-half of this fall takes place during the first hour after anesthesia, the other one-half during the succeeding twenty-three hours. The blood regeneration goes on quite rapidly upon the survival of the anesthetic condition. The hemoglobin, however, is restored more slowly than the erythrocytes; hence the cells are inadequately supplied for the time being with hemoglobin. At the end of twenty-four hours the color index begins to rise rapidly, and it reaches the normal level after the lapse of approximately seventy-two hours in man. A few myelocytes, however, may still be present at this time."[2]

The human subjects employed were not purged before the administration of ether, and therefore any concentration of the blood (increase in the number of red cells) that was observed must have depended directly upon the anesthetic. Again, the question of the interfering influence of associated disease is largely eliminated from our experiments; and this, as well as the purging, appear, to our view, to be the common sources of fallacy in certain previous investigations; the latter condition (purging) increasing the number of erythrocytes, while the former (disease) was commonly associated with leucocytosis. It was previously pointed out by one of us (Anders) that the polycythemia resulting from ether anesthesia does not depend solely upon the preparatory treatment, including purgation, since this was purposely omitted in some of the cases belonging to the former series. The decidedly increased blood production or hemogenesis immediately following the administration of an anesthetic would appear to be a factor in bringing about the polycythemia according to our previous experiments. In other words, as shown also by Da Costa and Kalteyer,[3] invariably etherization produces increased hemolysis, following which there is rapid regeneration of cells, with an increase in the number of red corpuscles.

These observers in their admirable monograph, setting forth the results of a careful hematologic study of fifty cases, recommend that the hemoglobin should not register below 50 per cent in cases in which prolonged anesthesia, or major operations, are necessary. These authors also state that in one instance they administered ether when the percentage of hemoglobin was only 24; but they strongly emphasize the fact that such procedure should not be ventured upon except by the imperative necessity of a vital emergency. In three cases dying under collapse during anesthesia, Mikulicz found only 15 per cent of hemoglobin present in the blood.

T. L. Chadbourne,[4] in the study of twenty-one cases, found that there was an increase in the number of leucocytes per cubic millimeter following anesthesia. In his series of cases counts were made immediately after ether had been continued for a period of 16 2-3 minutes. The average increase in the number of leucocytes was found to be 37.3 per cent (the lowest 6 per cent, the highest 73 per cent). Chadbourne made differential leucocyte counts in five of his cases, and found that this increase affected both the polymorphonuclear cells and the lymphocytes to an equal degree.

DIFFERENTIAL COUNTS.

No.	Count. Before.	Count. After.	Increase per cent.	Time minutes.	Differential leucocyte count. Before.	Differential leucocyte count. After.	Number leucocytes counted. Before.	Number leucocytes counted. After.
9	21,290	27,220	23	25	Poly. 83.8% Mono. 14.0% Eosin. 0.2%	82.4% 17.6%	500	500
13	7,600	13,150	72	18	Poly. 71.1% Mono. 28.4% Eosin. 0.5%	69.4% 30.5% 0.1%	1,000	1,000
14	12,950	20,690	21	12	Poly. 69.8% Mono. 23.2% Eosin. 0.2%	69.8% 29.8% 0.4%	500	500
15	12,350	21,360	73	18	Poly. 82.8% Mono. 16.0% Eosin. 1.2%	77.6% 21.6% 0.8%	500	1,000
18	14,000	17,000	21	15	Poly. 83.2% Mono. 16.8% Eosin.	85.8% 13.8% 0 4%	1,000	500

[2] *Loc. cit.*

[3] *American Medicine*, March, 1901.

[4] *Philadelphia Medical Journal*, Feb. 18, 1899, p. 390.

All of these patients were victims of disease, and the majority of them showed over 10,000 leucocytes per cubic millimeter before anesthesia. It was also observed that the greater the preceding leucocytosis the more marked the increase resulting from the administration of the anesthetic. Operation, however, appeared to cause a slight reduction in the number of leucocytes in some instances at least.

Chadbourne in all his cases endeavored to eliminate the immediate result of operation, but it is to be remembered that he was dealing in a great measure with pathological blood. From a review by us of the literature, all authors agree that pathological blood suffers far greater destruction as the result of ether anesthesia than does normal blood.

A. von Lerber[5] has studied one hundred and one cases, making the counts both before and after ether anesthesia, and found the leucocytes to be increased in ninety-six instances. The remaining five cases should not be included, since a high-grade leucocytosis existed before the anesthetic was administered. In thirty-five instances the number of leucocytes was doubled, and in twenty-three trebled, as compared with the number found before the administration of ether. In von Lerber's series, however, there was no definite time at which the counts were made either before or after the anesthetic; neither was there any attempt to exclude the results which the operation possibly exercised upon the blood. In certain cases a blood examination was made twenty-four to thirty-eight hours before the administration of the ether.

In 1895 J. Chalmers Da Costa[6] made an extensive investigation of the action of ether upon the blood, and in concluding his valuable paper on the subject offers the following summary: "Etherization produces a marked diminution in the hemoglobin in the blood. The red corpuscles and the hemoglobin are especially affected in blood previously diseased. The white corpuscles show irregular changes which are not characteristic."

Hamilton Fish[7] has considered at length the blood changes that are known to follow the administration of ether with operation. Fish agrees that ether as an anesthetic causes a reduction in the hemoglobin, and also changes in the red cells; he further advocates the view that an anesthetic extracts oxygen from the oxyhemoglobin and combines with the latter. It is claimed that oxygen is extracted from the corpuscles, and should the hemoglobin register below 50 per cent, the corpuscles cannot afford the loss. It was found that in persons residing at an altitude of one mile the hemoglobin was reduced from 12 to 15 per cent during the first hour of anesthesia.

Fish makes mention of the fact that leucocytosis is produced by anesthesia, and that the increase in the number of leucocytes affects principally the polymorphonuclear elements. Mikulicz goes so far as to state that a general anesthetic, not specifying ether particularly, should not be administered where the hemoglobin registers below 30 per cent.

Oliver[8] reports a series of observations made upon animals with a view to determining whether or not normal red corpuscles are changed by ether anesthesia. From Oliver's experiments upon rabbits (each animal being kept under the influence of an anesthetic (ether) for one hour), he found an average blood fall of 1.1 before anesthesia and .98 after anesthesia. It was further found that during anesthesia the corpuscles appeared practically as normal. From the results of his experiments Oliver concludes that the administration of ether as an anesthetic does not cause injurious effects upon the healthy blood-corpuscles.

It is further admitted in Oliver's paper that ether may produce destructive changes in the previously diseased red blood cells. This observer advances the theory that examinations of the blood made before, during, and after the operations are not reliable, since certain hematological changes are the result of the operation.

The view that ether should not be administered as an anesthetic in cases in which the percentage of hemoglobin shows decided reduction is by no means a new one; but, on the contrary, refer-

[5] Quang: Dissert. (Berne), 1896.
[6] *Medical News*, March 2, 1895.
[7] *Annals of Surgery*, July, 1899.
[8] *Lancet*, June 27, 1896.

ence to the subject is made in nearly every article furnished by the literature. The percentage of hemoglobin regarded as necessary by the various authors in order to render ether anesthesia safe ranges from 30 to 50.

ANIMAL EXPERIMENTS.

Experiment No. 1 (B. L. 37).—Gray rabbit, female, apparently in perfect health; weight 2 K., 130 grms.; given ether twenty minutes. A small piece of gauze was used to form a cone, which was saturated with ether, of which 6 drachms was employed. The animal's blood was counted ten minutes before ether was begun, and at various intervals after the administration of the anesthetic until the animal's blood had returned to the normal.

Ten minutes before ether:

1. Red blood cells 4,462,000; leucocytes 16,000; hemoglobin 60 per cent; no crenation; the leucocytes stained pale with hematoxylin.

Twenty minutes after ether:

2. Red blood cells 5,750,000; leucocytes 24,000; hemoglobin 50 per cent; there were many basophilic cells; also normoblasts; poikilocytes few, and a few highly stained microcytes.

DIFFERENTIAL COUNT TWENTY MINUTES AFTER ETHER.

Polynuclear	44.5	per cent.
Mononuclear	2.0	" "
Lymphocytes (large)	3.1	" "
Lymphocytes (small)	38.3	" "
Transitional	0.8	" "
Eosinophilia	9.8	" "
Leucocytic shadows	1.5	" "

Forty-five minutes after the ether was begun:

3. The red cells were 3,567,000; leucocytes 24,000; hemoglobin 52 per cent. Many red cells stained heavily, and many others were distorted, stained faintly, and showed indistinct margins. There was an increase in the large lymphocytes and basophiles. Polymorphonuclear leucocytes and small lymphocytes showed a less marked increase.

Twenty-three hours after ether (weight 2 K., 10 grms.; loss 120 grms.):

4. Hemoglobin 30 per cent (loss 22 per cent); reds 4,000,000; whites 8000. Many red cells were found almost devoid of hemoglobin, appearing as nearly colorless disks whose margins were slightly stained. These cells were distorted at times, and were always swollen and did not display their normal central concavity. Other of the red cells were shrunken to appear as deeply stained spheres (microcytes). The general picture of the blood was that of a surface studded with overstained microcytes and understained macrocytes, and many poikilocytes. The normal sized red cells all displayed a rather large, pale central spot. Occasionally red cells showing punctate areas of basic degeneration were seen. Few nucleated red cells (normoblasts) were present. Leucocytes showed nothing abnormal, although the lymphocytes were somewhat increased.

Forty-five hours after ether:

5. Red cells 4,500,00; leucocytes 6000; hemoglobin 46 per cent. Changes practically those noted twenty-three hours after ether.

Seventy-two hours after ether:

6. Red blood cells 4,980,000; leucocytes 10,660; hemoglobin 47 per cent. Polymorphonuclear cells predominant. Red cells well formed, stained readily, but were pale.

One hundred and four hours after ether:

7. Stained specimens appear as normal. Red cells 4,330,000; leucocytes 10,000; hemoglobin 51 per cent. It will be seen that the blood of this animal did not remain normal, though the animal gave no other evidence of being ill.

One hundred and eighteen hours after ether:

8. Red cells 3,500,000; leucocytes 21,600; hemoglobin 40 per cent. All the red cells were pale, and many of them showed a special affinity for both the acid and basic stain (polychromatophilia). Other evidences of cell degeneration (as distortion and crenation) were also present.

The leucocytes did not return to normal after anesthesia, yet their relative proportions were maintained (as shown by the differential count of 600 leucocytes).

Experiment No. 2 (L. B. 41).—On April 15 gave black female rabbit ether; weight 3 lbs. 3 ozs.; 15 Cc. of the anesthetic was given.

Before ether:

1. Red blood cells 3,968,700; leucocytes 4200; hemoglobin 65 per cent.

Twenty-five minutes after ether:

2. There was no appreciable loss in

weight. Red blood cells 4,375,000; leucocytes 6500; hemoglobin 55 per cent. There was present decided poikilocytosis. Microcytes and macrocytes numerous. Many of the red cells appeared as pale swollen disks which were poor in hemoglobin. Other of the red cells stained unevenly, but true punctate basic degeneration was not present.

One hour after ether:

3. Weight 3 lbs. The red blood cells numbered 3,280,000; leucocytes 8500; hemoglobin 48 per cent. Stained blood as found at twenty-five minutes after ether, except that the polynuclear leucocytes displayed many coarse brownish granules. Nucleated red cells were common.

Twenty-seven hours after ether:

4. The red cells numbered 4,690,000; leucocytes 6200; hemoglobin 43 per cent. All red cells pale; nucleated red cells (normoblasts) common.

Fifty-eight hours after ether:

5. The red cells numbered 4,810,000; leucocytes 6800; hemoglobin 64 per cent. The stained blood was found to be practically normal.

SECOND ANESTHESIA (L. B. 41) MAY 4, 11 A.M.

6. Seventeen days after the blood had returned to normal the red blood cells numbered 3,016,000; leucocytes 8000; hemoglobin 50 per cent.

The reduction of 14 per cent in the hemoglobin content, the moderate lowering of the number of red cells and slight increase in the leucocytes, and gradual loss in weight, are features to be observed in nearly all rabbits after they have been detained in the laboratory for even a short period of time. The impoverishment of the hemic tissue is probably the result of immediate surroundings, captivity, etc., and must needs be taken into consideration when attempting to draw definite deductions from animal experimentation.

After being under ether for one hour (May 5):

7. The animal was in good condition; one ounce of ether had been given. The red blood cells numbered 5,120,000; leucocytes 9200; hemoglobin 49 per cent. At first glance the effects of ether upon the blood appear to be confusing in this experiment, and demand that we call special attention to one of the common sources of error in hematological research. The red cells have increased from 3,016,000 per cubic millimeter to 5,120,000 (an increase of 2,104,000). This increase in the red cells is directly the result of cyanosis, and when we consider the number of red cells in each cubic millimeter of undiluted blood and the percentage of hemoglobin correlatively, it is apparent that each individual red blood cell is now carrying but little more than one-half the hemoglobin it did before etherization. The white cells are also reduced in proportion to the number of red cells now present.

After being under ether for 100 minutes:

8. One and one-quarter ounces of ether had been given (now discontinued). The red cells numbered 4,440,000; leucocytes 13,600; hemoglobin 43 per cent. Leucocytes appeared to be about normal; red blood cells were much distorted, and showed considerable variation in staining properties, many staining pale, while others were overstained and deformed, but there was less variation in the size of the cells than was displayed twenty minutes after the administration of the ether had been commenced.

Twenty-four hours after ether anesthesia:

9. The red blood cells numbered 3,820,000; leucocytes 8000; hemoglobin 53 per cent. Cells fairly regular in size; poikilocytes rather common, and many crenated cells; leucocytes appeared to be normal.

Forty-eight hours after ether (May 6):

10. The red blood cells numbered 4,330,000; leucocytes 6000; hemoglobin 50 per cent (normal). Size of red cells uniform; crenated cells were uncommon; poikilocytes none. There were a few pale red blood cells.

Nine days after ether (May 13):

11. The red blood cells numbered 4,490,000; leucocytes 6000; hemoglobin 50 per cent.

THIRD ETHERIZATION (MAY 16).

Before ether:

12. The red cells numbered 3,920,000; leucocytes 6200; hemoglobin 51 per cent.

Under ether twenty minutes:

13. The red cells numbered 4,470,000; leucocytes 6000; hemoglobin 47 per cent. Here the rise in the number of red cells

was again enhanced by cyanosis, which in reality indicates that the hemoglobin for each individual red cell is greatly reduced.

Under ether one hour:

14. The red blood cells numbered 4,200,000; leucocytes 5600; hemoglobin 45 per cent. The red cells when stained displayed practically the changes noted at the second etherization, except that all changes were less decided, while the blood returned to the normal in about thirty-six hours.

Experiment No. 3. (L. B. 21).—May 5, 1902, a yellow rabbit, male, weight 4 lbs. 5 ozs.

Before ether:

1. The red blood cells numbered 6,230,000; leucocytes 13,000; hemoglobin 82 per cent. Films when fixed and stained with eosin and hemotoxylin showed the red cells to be well formed and normally stained; leucocytes also appeared as normal.

Animal under ether twenty minutes (one-half ounce of drug used):

2. The red blood cells numbered 5,760,000; leucocytes 6200; hemoglobin 76 per cent. The stained blood was normal except for a few feebly stained red cells, some of which appeared as mere shadows. This experiment differs radically from those previously related, since both the red cells and the leucocytes were reduced as the result of ether anesthesia. The fact that the leucocytes numbered 13,000 per cubic millimeter before the experiment may deserve special mention in this connection.

Animal under ether sixty minutes (one ounce of drug used):

3. The red cells numbered 5,430,000; leucocytes 6600; hemoglobin 72 per cent (loss 10 per cent). Loss in weight 1½ ounces. Stained blood showed decided poikilocytosis; cells stained fairly well, but displayed numerous unstained areas (punctate basophilia); microcytes and macrocytes were numerous. Pale cells previously noted present.

Twenty-four hours after ether:

4. Animal's weight normal, and he appeared to be in perfect health. The red cells now numbered 5,210,000; leucocytes 5250; hemoglobin 71 per cent (loss 11 per cent). In the stained blood, large lymphocytes and eosinophilic myelocytes (?) were rather common. The red cells were pale, and a few normoblasts seen.

Forty-eight hours after ether:

5. The red cells numbered 6,310,000; leucocytes 8660; hemoglobin 85 per cent (2 per cent above normal). The stained blood was as normal. In striking contrast to the previous results of ether anesthesia upon the number of leucocytes per cubic millimeter, this experiment does not show an increase but a decrease in the number of leucocytes. A similar result was observed in the case of one of our observations upon the human subject (see experiment No. 2).

SECOND ETHERIZATION (MAY 16, 11 DAYS AFTER FIRST ANESTHESIA).

6. The red blood cells numbered 4,730,000; leucocytes 8000; hemoglobin 79 per cent. Stained blood normal. The animal was given ether twenty minutes (½ ounce being employed), when death ensued. Just prior to death the red cells numbered 7,880,000; leucocytes 8000; hemoglobin 57 per cent (a loss of 22 per cent).

This decided reduction in the hemoglobin, coupled with an increase of 3,150,000 red cells per cubic millimeter, was the only unfavorable sign and appreciable precursor of a fatal issue. This animal did not develop leucocytosis at either anesthesia, and the proportionate relation of the different leucocytes was normal.

HUMAN EXPERIMENTS.

Experiment No. 1 (L. B. p. 42).—J. H., male, aged thirty-three years, apparently in good health, was given ether without previous purging.

Before ether:

1. The red blood cells were 4,080,000; leucocytes 7600; hemoglobin 86 to 95 per cent, several estimates being made with different instruments. Stained blood was in every way normal.

Under ether twenty minutes:

2. The red blood cells were 6,150,000; leucocytes 16,000; hemoglobin 79 per cent. No poikilocytes; microcytes numerous; no macrocytes found. All cells stained palely but evenly throughout. White cells showed an increase in the polynuclear elements.

One hour after ether:

3. The red blood cells numbered 8,220,000; hemoglobin 74 per cent, an increase of 2,070,000 cells per cubic millimeter. From the degree of cyanosis present it is fair to attribute a liberal portion of this increase to this condition. Hand in hand with an increase in the number of red cells, there was a loss of 12 per cent in the hemoglobin. It is at once apparent that 74 per cent of hemoglobin is an extremely low amount for a blood of such condensation, and that each red cell is extremely poor in coloring pigment. Leucocytes 9800. The leucocytes, which rose from 7600 to 16,000 during the first twenty-five minutes, had now dropped to 9800, despite the extreme degree of blood concentration. Studying these figures correlatively, one is forced to believe that a true leukopenia exists. Occasionally cells were seen which stained palely; no crenated cells. Variations in size of cell decided.

DIFFERENTIAL LEUCOCYTE COUNT.

Polymorphonuclear	cells	80.97%
Myelocytes	"	4.27 "
Transitional	"	11.00 "
Large mononuclear	"	1.11 "
Small lymphocytes		2.22 "
Eosinophiles	1%	.43 "
		100.00%

Twenty-four hours after ether:

4. There had been no vomit, and the patient had taken food and claimed to feel well. The red blood cells were 4,576,000; leucocytes 13,600; hemoglobin 67 per cent (loss of 19 per cent). In the stained specimens there were seen many macrocytes, many of which stained poorly, some only as shadows, and these were liable to be distorted (poikilocytosis). Leucocytes mostly large, mononuclear and polymorphonuclear forms.

Thirty hours after ether:

5. The red cells were 4,600,000; leucocytes 12,000; hemoglobin 78 per cent (an increase of 11 per cent in six hours).

Forty-eight hours after ether:

6. The red cells were 5,700,000; leucocytes 10,600; hemoglobin 80 per cent. There was an appreciable increase in the polymorphonuclear elements and in small lymphocytes. Two myelocytes were found. Eosinophilic myelocytes were also present. Some of the cells stained irregularly, but there were no pale cells as previously seen.

Seventy-two hours after ether:

7. The red cells were 4,780,000; leucocytes 7400; hemoglobin 85-86 per cent.

SECOND ETHERIZATION.

Before ether (patient not purged):

8. The red cells were 5,005,000; leucocytes 6700; hemoglobin 80 per cent. The stained blood appeared perfect in all respects.

Under ether twenty minutes:

9. The red cells were 5,310,000; leucocytes 8200; hemoglobin 74 per cent. Few megalobasts were present, but there was practically no distortion of the red cells; microcytes few; all red cells stained perfectly; white cells about normal relation, except for slight apparent increase in the eosinophiles.

Under ether forty minutes:

10. The red cells were 5,250,000; leucocytes 12,000; hemoglobin 77 per cent. Ether discontinued.

One hour after starting ether:

11. Perspiration free and slight vomiting. The red cells were 5,120,00; leucocytes 15,000—the gradual rise continued, reaching its maximum number at this stage; hemoglobin 72 per cent.

Six hours after ether:

12. The red cells were 4,430,000; leucocytes 11,000; hemoglobin 63 per cent (a loss of 17 per cent). Vomited four or five times in afternoon.

It has appeared to us that this feature (continued reduction) of the blood after ether anesthesia is of the utmost importance, especially where a second anesthetic is required, and that it is possibly accountable for a fair proportion of deaths following a primary anesthetic. In this patient the red cells were also reduced, and both the erythrocytes and the hemoglobin remained at this low ebb for twenty-four hours. The fact that no operation was undertaken is also to be considered in this connection.

Twenty-four hours after ether:

13. The red cells numbered 4,660,000; leucocytes 5800; hemoglobin 63 per cent.

Forty-eight hours after ether:

14. The red cells numbered 3,820,000; leucocytes 5700; hemoglobin 70 per cent.

Seventy-two hours after ether:

15. Vomited twice, and there has been moderate sweating. The red cells numbered 5,747,000; leucocytes 8250; hemoglobin 73 per cent.

May 16, 100 hours after ether:

16. Vomited yesterday and this morning; frequent perspiration, anorexia, and constant drowsing. The red cells numbered 3,920,000; leucocytes 6000; hemoglobin 76 per cent.

May 26:

17. Vomited yesterday and this morning. The red cells were 5,010,000; leucocytes 5000; hemoglobin 72 per cent. The patient recovered.

CASE II.—Mrs. A., aged thirty-two years, married; healthy, except for dysmenorrhea. Vaginal examination disclosed some thickening of the right ovary and its tube, with stenosis of the os uteri to the degree that it was impossible to introduce a small probe. The anesthetic was administered for the purpose of dilating the cervix. The patient was not purged before the anesthetic, and had been permitted to take a light breakfast at 8.30 A.M.; the anesthesia was begun at 2 P.M. Just prior to the administration of the ether an examination of her blood gave red cells 5,275,000; white cells 11,400 per cubic millimeter; hemoglobin 84 per cent. Fixed and stained specimens of the blood revealed nothing abnormal.

A DIFFERENTIAL LEUCOCYTE COUNT GAVE:

Polymorphonuclear cells	53	per cent.
Eosinophiles	 1	" "
Mononuclears (large)	11	" "
Lymphocytes (small)	22	" "
Lymphocytes (large)	 8	" "
Transitionals	 5	" "

Ether sixteen minutes:

Red cells 5,950,000; leucocytes 10,200 per cubic millimeter; hemoglobin 78 per cent. There was no evidence of cyanosis at this time, and the patient appeared to be taking the anesthetic well. The stained blood showed great irregularity in both the form and size of the red cells; their surfaces staining unevenly, though this feature was not prominent.

Ether twenty minutes:

The red cells were found to number 6,400,000; leucocytes 6200 per cubic millimeter; hemoglobin 70 per cent. At this time there was present considerable evidence of cyanosis, and despite the decided increase in the number of erythrocytes per cubic millimeter, the hemoglobin continued to fall, having lost 14 per cent. The stained blood displayed a high grade of poikilocytosis, and there was present decided irregularity in the tinctorial properties of these cells. Many of the microcytes were deeply stained, while a smaller number of macrocytes were found to be very feebly stained. In many of the red cells staining normally, for the most part, there were irregular areas which remained unstained by the eosin. Certain other of the red cells were greatly swollen and appeared as mere shadows, surrounded by a marginal band of well stained protoplasm.

A DIFFERENTIAL LEUCOCYTE COUNT GAVE:

Polymorphonuclear cells	81	per cent.
Large lymphocytes	10	" "
Small lymphocytes	 6	" "
Transitionals	 3	" "

CASE III.—A female, fifty years of age, studied through the courtesy of Dr. W. Easterly Ashton. The woman had displayed some symptoms of endometritis for an indefinite period, but at no time had she exhibited evidence of anemia. She had neither been purged nor prepared in any way for the anesthetic, except that she had not received food in the morning. The blood was examined at 10.30 A.M., and the anesthetic promptly begun. Red cells 4,230,000; leucocytes per cubic millimeter 6800; hemoglobin 84 per cent. Stained specimens of the blood appeared to be normal.

A DIFFERENTIAL COUNT OF 600 LEUCOCYTES GAVE:

Polymorphonuclear cells	85	per cent.
Transitionals	10	" "
Large lymphocytes	 4	" "
Myelocytes	..... 0.5	" "
Large mononuclear	..... 0.5	" "

After ether for sixteen minutes:

Red cells 5,000,000; white cells 14,000; hemoglobin 68 per cent. This fall continued, and at the end of twenty minutes registered 65 per cent (a loss of 19 per cent). The patient did not display appreciable cyanosis at the time of the taking of this count. Until the present there had been no operative interference, and she had taken the anesthetic very well. The reduction of 19 per cent in the hemoglobin and the increase of 8400 leucocytes per cubic millimeter are therefore attributable to the administration of the anesthetic.

A DIFFERENTIAL LEUCOCYTE COUNT OF 600 CELLS GAVE:

Polymorphonuclear cells	..63.5	per cent.
Small lymphocytes	.....29.	" "
Large lymphocytes	..... 4.	" "
Large mononuclear	..... 2.	" "
Myelocytes	..... 1.	" "
Transitionals	..... 0.5	" "

The red cells, when stained with eosin and hematoxylin, were found to be deficient in hemoglobin, most of the cells being understained. Many others were distorted and swollen, their centers staining but slightly if at all, while their margins presented a narrow, rather well-stained band. In fact, the central spot normally present in the red cell was slightly enlarged in cells appearing to be otherwise normal. During the study of three specimen smears of the blood three nucleated red cells were found (normoblasts). Further observation upon this case was impossible.

CASE IV.—Observation made at St. Agnes Hospital, through the courtesy of Dr. E. Laplace. It was impossible to conduct an examination of the blood prior to the administration of an anesthetic. The patient displayed no evidence of anemia, the anesthetic being administered for the purpose of dilating a urethral stricture.

Ether for sixteen minutes:

Red cells 4,850,000; white cells 13,000; hemoglobin 70 per cent. Stained specimens of the blood were found to present the changes observed in Case III. Some of the red cells showed numerous streaks and punctate areas disseminated throughout their protoplasm which did not stain with eosin, and from which areas the hemoglobin had doubtless been extracted. These punctate areas were slightly stained by hematoxylin, but the picture presented by the individual cells was not that of true punctate basophilia. One nucleated red cell was seen (normoblast).

A DIFFERENTIAL COUNT OF 600 LEUCOCYTES GAVE:

Polymorphonuclear cells	53	per cent.
Eosinophiles	 2	" "
Small lymphocytes	14	" "
Large lymphocytes	10	" "
Large mononuclear leucocytes	16	" "
Transitionals	 4	" "
Myelocytes	 1	" "

SUMMARY OF FINDINGS.

Our experiments on animals showed that the hemoglobin was reduced in every instance as the result of ether anesthesia; this reduction varied somewhat according to the length of time the anesthetic was continued. It was further noted that approximately 10 per cent of hemoglobin was lost during the first twenty minutes after the anesthetic state was attained.

The hemoglobin reaches its lowest point in from twenty-four to thirty hours after ether anesthesia. Rarely, the oligochromemia is extremely great, but here again practically one-half the total reduction of hemoglobin was detectable during the first twenty minutes of complete anesthesia.

It was a rule for animals to display a less decided loss in hemoglobin during second and third etherizations than at the first ether narcosis, and it was further found that this loss was likely to be restored within a shorter period of time than was that resulting from the primary anesthesia.

In the human subjects the reduction in the hemoglobin was no less decided than in the rabbits, one-half or more of the fall in the coloring pigment taking place during the first twenty minutes of the anesthetic state. This was notable even in cases showing an increase of red cells per cubic millimeter; in fact the rule was to find the hemoglobin reduced and the red blood cells increased at the expiration of twenty minutes.

Polycythemia.—Polycythemia was always found to be more or less directly the result of cyanosis, and its extent was proportional with the degree of cyanosis. In all our experiments the number of red blood cells per cubic millimeter was increased after ether for a period of twenty minutes, and when cyanosis was evidenced this rise was seen to remain above the normal number of cells per cubic millimeter until the anesthetic was withdrawn and the lividity of the patient disappeared. That there had been an actual loss in the number of red blood cells per cubic millimeter as a result of the anesthetic appeared reasonably certain, yet it was not possible at all times to demonstrate this feature satisfactorily.

Changes in the red blood cells as the result of ether anesthesia were always present after the anesthetic state was attained. When cyanosis was present and the blood found to flow sluggishly from the site of puncture, the individual red cell appeared thick and compact, and its edges thickened. The central biconcavity was often obliterated from such cells.

In blood obtained during and after the ether narcosis, degeneration of the red cells was commonly present. This con-

sisted in a simple pallor of the cells in the milder forms, while in the more decided instances (great loss of hemoglobin) there were to be seen many microcytes which stained deeply, and a number of macrocytes whose protoplasm stained feebly. At times these large cells appeared as mere shadows surrounded by a well stained marginal band of varying depth.

Small streaks and irregular patches of pallor were seen disseminated over the surface of many of the red cells, and outlined areas from which the hemoglobin had been extracted.

True punctate basophilia, as seen in lead workers, was not well marked. At times the large distorted red cells (macrocytes) displayed an affinity for both the acid and basic stains (polychromatophilia).

Nucleated erythrocytes were occasionally found.

Leucocytes.—Leucocytosis was found to develop in three out of the four animal experiments, and to reach its highest point in from twenty minutes to one-half hour, following the commencement of anesthesia. In some instances the number of leucocytes did not show any marked increase, while in a third class these cells were greatly reduced per cubic millimeter as the result of the anesthetic. Where a reduction in the number of leucocytes per cubic millimeter was found to follow ether narcosis, it was likely to proceed to a leukopenia, resulting in approximately one-half the number of leucocytes originally present for the animal. While ether generally excited leucocytosis, this condition was of short duration, the leucocytes (per cubic millimeter) returning to the normal within from twelve to thirty hours.

Differential leucocyte counts were never found to show any points either of interest or value. In a few instances myelocytes were detected.

In the experiments upon human subjects it was found that an increase of from one-third to double the normal number of leucocytes followed ether anesthesia in one class of cases, this change taking place during the first twenty minutes of anesthesia. In one case they were slightly reduced in number. In all cases the leucocytes soon returned to the normal number per cubic millimeter following a return to consciousness. A differential study of the leucocytes disclosed nothing of positive clinical importance. Myelocytes (in small numbers) appeared in the human blood after ether anesthesia.

AN INORGANIC OIL SOLUTION OF ACETOZONE FOR TREATING SUPPURATION IN THE LOWER AIR-PASSAGES.

By John Johnson Kyle, B.S., M.D., Indianapolis, Ind.,

Lecturer on Otology, Laryngology, and Rhinology, and Assistant to the Chair of Surgery, Medical College of Indiana; Oculist and Aurist to St. Vincent's Hospital; Aurist and Laryngologist to City Hospital, Indianapolis; Member American Medical Association; Member American Academy of Ophthalmology and Otolaryngology; Late Major and Surgeon U. S. Volunteers.

During the past year I have had a great deal of clinical experience with a solution of acetozone in inorganic oil used in a nebulizer or atomizer for the treatment of various pathological conditions of the trachea and lower air-passages. My experience has shown me that in the treatment of certain conditions of the eye, due to trauma, and especially in the treatment of suppurative conditions of the nose and upper air-passages, a watery solution of acetozone does not meet the conditions much better than many of our more simple antiseptics; but I have found that a solution of the drug in inorganic oil sprayed into the lower air-passages is followed by the best results I have seen, and I am a convert to this treatment, and in fact, in such conditions as mentioned, I use no other medicinal treatment. I find that the suppurative condition is rapidly abated, frequent microscopic examinations of the secretions showing a rapid and progressive diminution of the microorganisms with a coincident amelioration of the symptoms. In illustration of these remarks I cite the following cases:

Case I.—Elderly man, engaged in public life, had suffered from periodical attacks of what was called bronchitis; these attacks having a history of some years' duration. General health of the patient was impaired, vitality lowered, and his ability to transact business seriously interfered with. A careful examination to which he was subjected on the occasion of his first visit determined a diagnosis of

chronic bronchitis. Expectoration was very profuse, particularly in the morning. At this time a careful microscopic examination of the sputum was made, and streptococci in almost pure culture were found in profusion. All of the mucous membranes of the air-passages were congested, swollen, and markedly hypersensitive. A catarrhal condition of the upper air-passages was also in evidence. As a result of past experience in similar conditions, I put the patient upon acetozone inhalant alone, no other medicine being given. The patient was directed to use this preparation in a small atomizer, spraying the drug into the throat and inhaling deeply, for a few minutes at each treatment, or until slight irritation was felt in the throat and trachea. This treatment was to be repeated four or five times daily. At the end of the week, when the patient reported at my office, another examination was made, and the general symptoms were somewhat abated. A microscopic examination of the sputum was also made at this time and showed only a few streptococci, which were found after a very careful search of several preparations of the sputum. The treatment was continued, and at the end of the third week no pathogenic organisms were found in any of the slides which were prepared at this time. The symptoms, both subjective and objective, were abated, and the patient's physical condition very much improved. I advised a continuation of the treatment once or twice daily until complete recovery was obtained, and sent the patient home. Through recent correspondence with him I learn that he is enjoying better health than for a number of years.

I attribute his recovery to the action of acetozone inhalant, and this case is an excellent example of the germicidal value of acetozone administered in the form of an oily spray for inhalation.

A certain technical point in the administration of acetozone inhalant must be observed in order that the good effects of the drug be obtained. It is this: The acetozone inhalant must be administered only for a few moments at a time, or until symptoms of irritation are manifested. If the administration of the inhalant is persisted in after these symptoms appear, it produces decided irritation, which in some cases is quite painful and persists during some hours. I have known the unpleasant effects to last more than twenty-four hours. This is not only unpleasant, but unnecessary, and tends to discourage the patient—in fact, one or two of my clients have not returned after the second or third treatment. I have found that it is quite sufficient to administer acetozone for a minute or two, allowing the patient to rest for two or three hours before another administration. In this way only slight irritation manifests itself, and this is more of an advantage than otherwise. Patients are not discouraged, and the results are all that could be desired.

I have in mind another case which shows the action of acetozone inhalant in a marked manner.

CASE II.—A young woman, unmarried, aged twenty-three years, had suffered from an acute attack of bronchial pneumonia some weeks before consulting me. She desired relief from constant bronchial irritation, attended with intermittent cough and some symptoms of tuberculosis. It appeared that her convalescence from pneumonia was unduly prolonged, and that her family had become much alarmed over her retarded recovery and "feared that she was going into consumption." She was pale, somewhat anemic, and suffered from extreme lassitude and weakness. Expectoration was quite profuse. I made a careful microscopic examination of the sputum, which disclosed a most interesting pathological condition. I had made quite a number of preparations, an examination of which disclosed practically the same condition in all of them. In order to minimize all chances of error in the findings, I had an independent examination made by Dr. Dodds, lecturer on bacteriology in Indiana Medical College, who verified my findings in every particular. This young lady's sputum contained quantities of streptococci, staphylococci, pneumococci, and Friedlander's bacilli, but no tubercle bacilli could be found at any time. The patient was put upon acetozone inhalant and directed to spray the drug into the lower air-passages, at the same time inhaling deeply, using a small but efficient hand atomizer. She was also advised to eat very plain, nourishing food, to remain out-of-doors in the sunshine as much as possible, to avoid hard work or exercise,

and the various emanations were to be insisted upon regularly. No other medicine than acetozone inhalant was prescribed or used. At the end of the week when she reported at my office, there was marked amelioration of the symptoms, and microscopic examinations of the sputum showed a marked diminution of the number of organisms. The treatment was kept up by the young woman, who reported weekly at my office. At the end of the fourth week her condition was so much improved, both physically and mentally, and the microscopic examination showed so few organisms, that she was sent out into the country, more for a change of scene and the more constant outdoor life than for anything else, and she was directed at the same time to keep up the inhalation of acetozone. There was a gradual and progressive diminution of the cough and expectoration, her general health showed a most marked improvement, and at the present time I believe her cured.

I could cite many other cases similar in outline to the two mentioned, but these are typical and illustrate my experience as well as a large number.

The formula for the solution which I have used is as follows:

Acetozone crystals, 0.5 gramme;
Chloretone crystals, 0.5 gramme;
Refined bland mineral oil, 99.0 grammes.

This was especially made up for me, but I understand that it can be obtained of most pharmacists.

A STATISTICAL REPORT OF THE CASES OF ACCIDENTAL GUNSHOT WOUNDS FOLLOWING THE FOURTH OF JULY CELEBRATION, TREATED IN THE CITY DISPENSARIES OF THE CITY OF ST. LOUIS WITH THE ANTITETANIC SERUM.

By Henry J. Scherck,
Chief Dispensary Physician, St. Louis Health Department.

Having investigated the deaths from tetanus occurring in the city of St. Louis following the celebration of the Fourth of July, 1903, I addressed a letter to the Health Commissioner, requesting that I be authorized to immunize every case of accidental gunshot wound produced by toy pistols, blank cartridges, cannons, etc., following the celebration of the national holiday of the present year. It is well in this connection to state that the fact that I intended to adopt this plan was freely given to the press, with the result that every paper published in the city of St. Louis gave it a great deal of publicity, and no doubt had the effect of having practically all cases of this class of wounds referred to the various city dispensaries in order that they might be immunized. This was further made advisable inasmuch as it being a legal holiday the depots for the supply of the serum were closed and the physicians were unable to obtain same. A number of physicians telephoned me requesting a supply of the serum. The request of each physician was answered by the statement that we would be glad to treat and immunize the patient if sent to the dispensary, which was done in every case. As will be seen from the tables that immediately follow, there were no less than 37 cases treated at the various city dispensaries.

In order that this report may be complete, I will give herewith a list of the names of the children treated during July and August of 1903, together with a list of those who died from tetanus, following the Fourth of July. There were in all 56 cases treated.

TABLE OF CASES TREATED DURING AND AFTER THE FOURTH OF JULY, 1903.

Name.	Description of wound.
Napoleon Bonapart	Gunshot, hand.
Clarence Decker	" "
Fred Hartman	" "
Tony Morgan	" side.
Jas. Martin	" abdomen.
Cy. Owens	" shoulder.
Edmond Powell	" hand.
Bernard Kelly	" "
Mary Parr	" "
Harry Rosenthal	" face.
Frank Boggs	" shoulder.
Otto Schroeder	" hand and face.
G. H. Lawson	" finger.
Frank Gardner	" hand.
Willis Tanhill	" finger.
Mike Brennan	" knee.
Fred Necker	" shoulder.
Bob Shanklin	" shoulder.
Tony Harris	" hand.
Wm. J. Peters	" leg.
Walter Brown	" hand.
Tony Sclorotto	" "
Nick Kohn	" "
Lizzie Martin	" "
Jake Harris	" "
Frank Morrison	" "
Wm. Rice	" "
John West	" "
Chas. Boss	" "
Ed Barnard	" "
Lonie Rock	" "
Geo. S. Wood	" "
W. Reinhard	" "
Harry Vinton	" "
Joe Holker	" face.
Hy. Jennings	" hand.
Albert Klinck	" "
John West	" "
Marshall Shetterly	" leg.
Eddy Gallagher	" hand.
John Buck	" "
W. Hanson	" "
Bertie Bottum	" "

TABLE OF DEATHS FROM TRAUMATIC TETANUS, JULY AND AUGUST, 1903.

Name.	Age.	Date of death.	Contributing cause.
Louis Benedick	11	July 7	Gunshot wound.
Clarence Decker	12	" 19	" "
Wm. Smith	9	" 11	" "
Edw. L. Hein	12	" 9	" "
Benj. Gross	12	" 11	" "
Edw. Dewal	16	" 12	" "
H. M. Burnstein	18	" 12	" "
Albert Mengerson	7	" 1	" "
Jacob Harris	11	" 13	" "
M. J. Brennan	18	" 12	" "
Clarence A. Roes	11	" 13	" "
Chas. Burnes	11	" 16	" "
Morris Finkelstein	12	" 16	" "
Edw. J. Weiss	13	" 20	" "
Ollie Williams	24	Aug. 3	" "
Chas. Holloran	9	" 29	" "

As will be seen from the above tables, out of 56 cases treated, there were no less than 16 deaths following, giving a percentage of 33½ of deaths.

This year a careful list was kept of the names and addresses of every child applying at the various city dispensaries, beginning on July 3. A circular letter was addressed by me to the various assistant dispensary physicians, instructing them as to the handling of these cases. They were told, first, to freely incise every wound; to thoroughly remove from same every particle of foreign matter found; to cauterize the wound thoroughly with a 25-per-cent solution of carbolic acid, and to apply a wet pack of a 5-per-cent solution of carbolic acid; after this, to inject into the abdominal wall 10 cubic centimeters of immunizing antitetanic serum, after having first thoroughly scrubbed the skin with soap and water and washed it off with alcohol. They were further instructed to have each case return daily for dressings and for record of temperature and other symptoms. Those cases that did not return were followed up by being seen at their residences. In all, 37 cases were treated and injected with the serum. *Not one single case developed tetanus.* There were four deaths, however, following July 3 of the present year. None of these, however, were immunized with the antitetanic serum, nor were they handled by the city dispensaries.

As a deduction from the above I have no hesitancy in stating that I believe that the injection of an immunizing dose of 10 cubic centimeters of antitetanic serum administered shortly after the infliction of a wound likely to produce tetanus will, without doubt, neutralize the poison introduced. I am equally certain from the cases of tetanus which I have observed that have been treated with the serum some time after the injury, the results have not been satisfactory. When the symptoms of tetanus have developed the patient is practically dying of the disease, and at this time the serum has little, if any, effect in curing it.

The following is a complete list of the cases treated, together with their age, color, date of injury, and description of the wound and the result:

Name.	Age.	Color.	Date of injury.	Description of wound.
Geo. Salary	17	W.	July 2	Penetrat'g wound right hand, tine pitchfork.
Harry Billings	13	W.	" 3	22 blank wad, penetrating upward between 3d and 4th fingers right hand.
Walter Hayes	10	W.	" 3	Gunshot wound right palm by 22 blank wad.
Chas. Oates	12	W.	" 3	Gunshot wound left foot.
Frank Sharz	13	W.	" 3	Gunshot wound middle fingers and palm left hand.
Reuben Cohn	13	W.	" 2	Powder burn from 22 blank.
Geo. Bipscomb	14	C.	" 3	Gunshot wound 2d joint left index-finger.
Morris Arnowksi	8	W.	" 3	Gunshot, 22 blank, abrasion left buttock.
Clarence Fellows	18	W.	" 3	Gunshot, 22 blank, left shoulder.
L. Rosenbaum	14	W.	" 3	Gunshot, left palm.
S. Fulton	12	W.	" 3	Gunshot, right hand and index.
Franz Natoli	...	W.	" 3	Gunshot wound left hand.
Erick Burns	13	W.	" 4	Torpedo explosion, lacerated wound right instep.
R. Fehlmann	14	W.	" 4	Wad from toy cannon in left palm.
Leo Feicker	16	W.	" 4	Gunshot, left hand.
Fred Foster	8	W.	" 4	Gunshot, lower 3d left thigh.
Jno. Hartin	12	W.	" 4	Wad from 22 blank, left palm.
Willie Dunn	10	W.	" 4	Wad from 22 blank, left palm.
Geo. Major	8	W.	" 4	Bomb explosion, lacerated wound right palm.
Elmer Olsen	...	...	" 4	Gunshot, left index-finger.
Jos. Palazola	13	W.	" 4	Gunshot, left palm, 22 wad.
L. Casey	12	W.	" 4	Gunshot, right index, 22 wad.
Irene Springer	12	C.	" 4	Gunshot, right hand
Lue Shuee	43	China.	" 4	Gunshot, blank wad over right orbit.
Chas. Ogle	8	W.	" 4	Gunshot wound right palm.
Jno. Prack	10	W.	" 4	Gunshot wound left palm.
F. Jackman	7	W.	" 4	Gunshot wound left palm.
W. J. Sullivan	18	W.	" 4	Powder can explosion, lacerated scalp and forehead.
E. Schneider	...	...	" 5	Gunshot wound, 22 blank wad, right hand.
Frank Leonard	13	W.	" 5	Gunshot wound, 22 blank, left little finger.
Jos. Mahon	12	W.	" 5	Gunshot wound right palm.

Name.	Age.	Color.	Date of injury.	Description of wound.
Arthur Clemmons	14	W.	July 3	Gunshot, left palm.
Leo Dolan	...	W.	" 5	Gunshot, left hand.
Alois Erdelen	...	W.	" 5	Gunshot, left palm.
Hy. Schlenker	...	W.	" 4	Gunshot, right hand.
Rudolph Henger	...	W.	" 4	Gunshot, right index-finger.

The following are the deaths recorded in the mortuary office of the Health Department during July and August from tetanus, and as before mentioned, none of them were handled by the city dispensaries, nor were they immunized at the time of the infliction of the wounds:

DEATHS FROM TETANUS DURING JULY, 1904.

Name.	Age.	Date of death.	Contributing cause.
Chas. J. Helvey	13	July 7	Accidental gunshot wound.
Geo. Walz	14	July 14	Accidental gunshot wound.
Lizzie Cleveland	...	.....	Accidental gunshot wound.
Ed. McKee	44	July 20	

The following letter from the City Bacteriologist is also of great interest in connection with these statistics:

ST. LOUIS, MO., Aug. 25, 1904.

Dr. Henry J. Scherck,
Chief Dispensary Physician, St. Louis:

DEAR SIR—The following is my report upon the tetanus toxin and tetanus antitoxic serums which you submitted to me for testing:

The toxin was labeled 1:40,000,000 gramme of the toxin as the M. L. D. for a gram of guinea-pig. The commercial serum was labeled 100,000 immunizing units per c. c. The special serum was labeled 200,000 immunizing units per c. c.

The antitoxic serums had been standardized, so that one unit would protect one gram of guinea-pig against one hundred of its M. L. D.

I inoculated four guinea-pigs, each with one hundred times its M. L. D. of toxin. Pig No. 1, which weighed 310 grams, was kept as a control, receiving no antitoxin.

Pig No. 2 weighed 400 grams. 400 units of the special serum was given, which was the exact amount necessary to protect it against the one hundred M. L. D. which it had received.

Pig No. 3, weight 460 grams, was given 460 units of the commercial serum, which was the exact amount necessary to protect it against the one hundred M. L. D. which it had received.

Pig No. 4, weight 430 grams, was given 1720 units, which was four times the amount necessary to protect it against the one hundred M. L. D. which it had received. I used this large amount so that if the serum had been standardized wrongly, or had deteriorated in strength, it would have four times the advantage in protecting the animal which had received it.

RESULTS.

The unprotected pig at the end of sixteen hours, which was the earliest time observation was made, showed symptoms of tetanus on the side wherein the inoculation was made. It died at the end of twenty-four hours. None of the other pigs showed the slightest symptoms of tetanus. Seven days have now elapsed.

Respectfully,
C. A. SNODGRAS, M.D.,
City Bacteriologist and Pathologist of the City Hospital.

The above report shows that the serum used was efficient and fully protected the animals.

315 CENTURY BLDG.

THE PROBLEMS OF THERAPEUTICS.[1]

BY SIR LAUDER BRUNTON, M.D., D.Sc., LL.D.,
Consulting Physician to St. Bartholomew's Hospital, London.

(Concluded from p. 656.)

In my address at Moscow in 1897 I ventured to formulate the idea that "immunity, natural or acquired, is nothing more than an extension to the cells of the tissues generally of a power which is constantly exercised during digestion by those of the intestine and liver."

When microbes were just beginning to be recognized as the cause of infective disease too much importance was attached to the mechanical effects which they might produce in the blood-vessels and tissues. As their mode of action became better known, this view was to a great extent given up, but though the small vegetable microbes, bacilli and cocci, have little injurious mechanical action, this is not the case with some minute organisms belonging to the animal kingdom, and such organisms of late years have become more and more recognized as causes of diseases. In elephantiasis the lymph channels become blocked by the ova of a small worm which inhabits the blood, and thus the enormous swelling characteristic of the disease is produced. Within the last few years that dreadful scourge of tropical countries, malaria, has been discovered to be due to an animal parasite, and Manson and Ross have shown that the source of infection is the mosquito. By destroying mosquitoes or preventing their multiplication the disease can be to a great extent prevented, but we are still dependent upon bark, quinine, and arsenic as remedies to destroy

[1] Address delivered before the Section on Therapeutics and Pharmacology at the International Congress of Arts and Science at St. Louis, Sept. 24, 1904.

the parasite and cure the disease. These are not invariably successful, and we are still in want of medicines which shall infallibly destroy the parasite. The same is the case with other maladies where the infective microbe is of animal origin as in sleeping sickness, which is now attributed to a minute worm in the blood, or of vegetable origin as in ulcerative endocarditis, or of uncertain origin as in yellow fever. But all these diseases excite much less attention than that which is perhaps more dreaded than any other in temperate climates, namely cancer. We do not as yet know the pathology of this disease. It has been shown that in it the cells of the affected part multiply and grow in a different manner from that of ordinary tissues. They assume a reproductive type and grow independently of the tissues of the body in which they are situated. We know that portions of carcinomatous growths may be carried by the blood stream from one part of the body to another, where they may act as new foci, but they can be transplanted with difficulty if at all from one animal to another, and thus it is evident that although their reproductive power is great their vitality is feeble. Therefore what one may hope for is, that although all the drugs hitherto tried have been powerless to prevent the life and growth of such tumors, yet something may yet be found which will attack and destroy them and nevertheless leave uninjured the healthy tissues by which they are surrounded. Lupus and rodent ulcer situated on the surface of the body have been successfully treated by the *x*-rays and ultraviolet rays. These have little effect on deep seated cancer. My friend Sir William Ramsay thinks however that the emanations from radium which are to a certain extent soluble in water might be administered with a view of destroying internal cancer, more especially as he has already found that they seem to have no injurious action when given to healthy animals.

In the case of cancer it is certain that groups of cells take on a life of their own and live independently of the wants of the organism as a whole, and in some other diseases we find that entire organs become too active and thus injure the health of the whole body. One of the best examples of this is the thyroid gland, which, when hypertrophied, produces, through the secretion which it pours into the blood, a curious set of nervous symptoms, dilatation of the vessels, palpitation of the heart, tremor, restlessness, excitement and rise of temperature. In the disease known as Graves's disease these symptoms exist and may possibly be aggravated by the condition of the nervous system which causes the characteristic protrusion of the eyeballs and the swelling of the thyroid itself. But that most of the symptoms are really due to the thyroid secretion is shown by the fact that they may all be observed after excessive administration of dried thyroid gland. Here we have a toxin formed within the body by the overaction of one of its parts, and at present we have no satisfactory antitoxin by which we can remove the symptoms, although suprarenal gland has an action somewhat antagonistic to that of the thyroid, and this gland or its extract when administered internally in cases of exophthalmic goitre sometimes appears to be beneficial. The case is very different however when, instead of being excessive, the action of the thyroid is deficient. When this occurs in adults the circulation becomes poor, the skin cold, the movements of the body and the action of the mind slow, the aspect becomes dull and heavy and the features puffy and swollen. When thyroid gland or its extract is given all these symptoms disappear, and the patient becomes healthy for the time and usually remains so as long as the administration is continued. When deficiency of the thyroid occurs in childhood the effect of treatment is still more manifest, for the child thus affected becomes stunted both in body and mind, is dwarfish, feeble, and idiotic. Under the administration of thyroid it grows rapidly and becomes strong and intelligent, and indeed develops into a perfectly normal person. The cure effected by thyroid in such cretins is one of the most marvelous achievements of therapeutics, and many attempts have been made with portions of other organs or extracts of them to supply material which is supposed to be absent in various diseases.

The first instance of this method of treatment, or opotherapy as it is called, was I believe my employment of raw meat thirty years ago to supply the body

with a ferment to use up sugar in diabetes.* The method was reintroduced by Brown-Séquard with more success, but it was not until the use of thyroid gland and its extract that the potentialities of the method became acknowledged. It is more than eighteen hundred years since the question was asked "Who can add a cubit to his stature?" and all this time we have remained ignorant of any plan by which we could add a single inch to a child's stature. Yet it now seems possible that by the use of thyroid gland and pituitary body, children who would be otherwise stunted may grow not only to the normal size but even above it.

So long, however, as we do not know the chemical nature of the substances which exercise such an extraordinary effect upon tissue change we shall not be able to deal with them satisfactorily. We can now, in a way that was formerly impossible, regulate the temperature in fever. The clinical thermometer not only shows us the extent to which fever is present, but it enables us to stop the application of our remedies in time so as not to reduce the temperature to too great an extent. Cold water, ice and diaphoretics were formerly the only antipyretic remedies, next salicin and quinine were introduced, then salicylic acid was made synthetically, and being cheap was used extensively, and within the last thirty years an increased knowledge of chemical methods and of the relationship between chemical constitution and physiological action has enabled numerous synthetic products to be formed, some of which may be more useful in certain cases than the original salicylate of soda.

A great many of these substances primarily intended to reduce the temperature have turned out to have a still more important action, namely, the relief of pain. There is no doubt that pain is useful as a warning against conditions which tend to destroy the organism, and leads us to shun or remove these conditions to the great advantage of our health, but it is not always possible to do this, and pain *per se* is one of the greatest evils that poor humanity has to bear. The introduction of antiseptics has completely revolutionized the art of surgery because it allows operations to be done with almost certain success which would in former days have almost inevitably proved fatal from unconscious contamination of the wound by disease germs. But the greatest triumphs of surgery have only been rendered possible by the discovery of anesthetics. Previous to the work of Long, Jackson, Wells, Warren and Simpson rapidity of operation was everything—careful but long continued manipulation was impossible, because the long continued pain of the operation would inevitably have killed the patient. Even the minor pains of neuralgia, neuritis and headache, though not dangerous to life, are most distressing to the sufferer. Formerly there was almost no drug to relieve these excepting opium, while now we have phenacetin, antipyrin, phenalgin, and a host of others, and chemists are daily at work preparing new and perhaps even better pain killers.

Hardly, if at all, less distressing than pain is sleeplessness, and here again our powers of helping the patient have been enormously increased of late years. When I was a student almost the only hypnotics used were opium, henbane, and Indian hemp. The latter two were very unsatisfactory, and practically one pinned one's faith on opium, which had to be combined with tartar emetic in cases of fever. Then came the introduction by Liebreich of chloral, which was not only a great boon in itself, but marked an epoch as one of the first instances of rational therapeutics, the application of a certain drug in disease because of its pharmacological action. Now we have any number of hypnotics, some of which are useful because they act on the nervous system itself and produce sleep without depressing the heart, and can thus be given where the circulation is already weak, while others, like chloral, not only act on the cerebrum, but lessen the force of the circulation, and by thus diminishing the flow of blood through the brain assist it to rest and aid the onset of sleep. Formerly, when the circulation was too active, the chief depressants were mercurial and other powerful purgative medicines, bleeding, tartar emetic, vegetarian diet or partial starvation. Although these means may still be employed with advantage in proper cases, yet we have in addition a new set of remedies, viz., vasodilators, including nitrites, nitrates, and possibly a good many sub-

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stances which dilate the vessels and lower the tension in the arteries, a tension which may be dangerous on the one side to an enfeebled heart, and on the other to an atheromatous artery in the brain.

When the heart is failing we have a series of cardiac tonics and stimulants. Foremost amongst these, perhaps, may be put strychnine, the action of which on the heart was practically unknown when I was a student, and perhaps now it is hardly sufficiently recognized. At the time of which I speak, digitalis was looked upon as a cardiac depressant, and almost the only cardiac stimulant that was known was alcohol. Now digitalis, strophanthus and a number of others are regularly used as cardiac tonics, and their power of contracting the vessels is also sometimes useful in removing dropsy; when this action is likely to be harmful to a weak heart it may be lessened by the simultaneous administration of vascular dilators. We still, however, want drugs which will act only on the heart, or only on the vessels. We require medicines which will diminish the cardiac action and dilate the vessels for use in high tension, such as so often occurs in gout, and we need drugs which will make the heart beat more forcibly while they cause the vessels to contract and raise the tension in cases of debility.

But prevention is better than cure, and if by modifying tissue change we can obviate the high tension and hypertrophy of the heart which so frequently lead to apoplexy, or the atheromatous condition of the vessels which leads to senile degeneration of the brain or premature old age, we shall lessen the necessity for either cardiac tonics or vascular dilators. Some authorities claim that they can do this by vegetarian diet, limited in quantity as well as quality, while others would treat it by a diet almost entirely of meat, with liberal potations of hot water.

The subject of diet is one regarding which the most contradictory opinions prevail, and there is a sad want of precise knowledge upon which to base dietetic rules. We may hope, however, that the investigation at present being conducted by Professor Atwater under the United States government, combined with that which is being carried on under the auspices of the Carnegie Trustees, will furnish the information we need.

Time will not allow me to do more than mention the rest—aerotherapeutics, balneotherapeutics, and hydrotherapeutics; the rest-cure, which is associated with the name of one of America's most brilliant and versatile sons, Weir Mitchell; massage and movements, which Ling and his pupils both in Sweden and elsewhere have done so much to elaborate, and which when rightly used may be so beneficial, and wrongly used so harmful.

For all these branches of therapeutics we require a more exact knowledge of their action and the rules for employing them, so that even those who have made no special study of them may employ them rightly in all diseases in which they may possibly be of service.

Another method of cure consists in eliminating waste products from the body by rendering them more soluble, and thus in gout while limiting the amount of water drunk would give lithia, piperazine, piperidine and other substances which increase the solubility of uric acid. Before therapeutics can make much advance in this direction we must know more about the pathology of gout and tissue metabolism generally, and we may then hope that not only will people be more free from the manifold symptoms that gout produces, but will live longer, and the time of their activity, bodily and mental, will continue nearly as long as life itself. The power of increasing elimination of nitrogenous waste which urea possesses in a marked degree is shared by other substances belonging to the so-called purin group, and day by day fresh bodies belonging to this chemical group are being made synthetically. Some of the new ones seem to have a greater power of eliminating waste than any we have hitherto had. The observations of Richardson that alcohols vary in their action according to their chemical composition, and of Crum, Brown and Fraser that alteration in chemical constitution brought about change in physiological action, are now beginning to bear rich fruit, and the synthetic preparation of remedies having different pharmacological properties, along with our increasing knowledge of pathology, gives us much hope for the future of therapeutics. More than two hundred years ago Locke said if we knew the effect of drugs on man as a watchmaker does those of his operations on a

watch, we should know that aloes would purge, hemlock would kill, and opium make a man sleep. One of the great problems of therapeutics is not only to know what drugs to use in order to obtain certain effects, but to know how to make such drugs if we have not got them at hand.

The struggle for existence does not occur only between man and beast, man and man, nation and nation, nor even between individual beasts or plants. It takes place also between cell and cell, not only between those cells which we term microbes and the cells of which the human body consists, but even between those which form the different parts of the body itself. The great object of this congress is to unify knowledge, to render evident the similarity of the laws which govern phenomena of the most diverse character, and it is therefore interesting to find that the grand problem of therapeutics is for the cell what those of religion and sociology are for the man, viz., to learn how to regulate the environment of each man or cell in such a manner that the individual shall not work for his or its own good alone, but for that of others as well, and that useless or noxious individuals shall be repressed or destroyed.

When we are able to regulate cell life by food, air, water, exercise, inoculations or medicines, we shall be able to relieve or remove weakness, pain or distress not only from the bodies but also from the minds of our patients, to maintain health, increase strength, and prolong life to an extent of which at present we can hardly dream.

ON THE RELATION OF THERAPEUTICS TO OTHER SCIENCES IN THE NINETEENTH CENTURY.[1]

By Oscar Liebreich, M.D. Berlin, D.C.L. Oxon.,
Professor of Pharmacology in the University of Berlin.

(Concluded from p. 660.)

The 19th century has been distinguished by the discovery of the causes of disease. But this does not give us means of "curing." As the history of therapeutics, however, shows that in the case of serious maladies, such as syphilis and malaria, the remedies have been found long before the recognition of their cause, we must continue to search for remedies independently of the causes of disease. So far the knowledge of morbific agents has been more important for prevention than for cure.

On the other hand, remedies like iodoform are entirely ineffective on bacteria outside the system, whereas after the entrance of this substance into the cells an energetic force is opposed to the invaders. As in every observation we must be careful not to draw too far-reaching conclusions, because the possibility of reactions taking place outside of the organism may also hold good within it, as, for instance, in the treatment of lead poisoning. Therapeutics, thanks to Melsens, celebrated a great triumph here, for the iodine of the iodide of potassium administered in this disease combines with the lead united to the albumen molecules, forming iodide of lead, and can then leave the body dissolved in the alkaline juices of the organism, and thus bring about a cure.

It may be said in passing, that in the case of many active substances specific chemical processes take place, as are, for instance, seen in phosphorus poisoning. Phosphorus, though usually so easily oxidized, when absorbed, is not oxidized quickly enough by the oxygen of the cells; in the presence of turpentine oil, however, a transference of the oxygen occurs, and the phosphorus is more rapidly oxidized, combines with the oil of turpentine, and, as we must assume, forms turpentine-phosphoric acid, which is innocuous to the system. By the ingestion of oil of turpentine the organism can thus overcome the cause of illness.

Unfortunately we do not possess similar remedies for some other toxic morbific agents which are taken up by the cell.

Since for the progress of therapeutics it is necessary to consider the chemical and physical qualities of the body, therapeutics is naturally dependent upon progress in chemistry. Although, as has already been shown, pharmaceutical chemistry can be utilized for the benefit of medicine, the results of theoretical chemistry have not as yet become of much distinct importance for therapeutics. In the first half of the 19th century

[1] Address delivered before the Section on Therapeutics and Pharmacology at the International Congress of Arts and Science at St. Louis, Sept. 24, 1904.

distinguished chemists occupied themselves with the laws of matter independent of biological processes. Various chemical and physical theories followed each other, and the theories propounded by Dumas, Gerhard, Williamson, and Kekulé eventually developed into van t'Hoff's stereochemistry, and in the physio-chemical researches. But these discoveries, though made outside the limits of biology, came to be of great importance to medicine when medical chemistry, fostered both by chemists and physicians, began its growth.

In the beginning of the century theoretical views in regard to drugs had to contend in part with the philosophical tendencies of those times, in part with the ill success which formerly attended the jatro-chemical and physio-chemical schools of physicians. Progress in the application of therapeutical measures was left to pure empiricism, and the view was accepted that what applied to food would also do for medicine; for we became acquainted with the use of coffee, tea, chocolate, potatoes, etc., not through theory, but simply through empiricism. This standpoint could be justified all the more because many important remedies, such as quinine, arsenic, and Peruvian balsam (which last substance has almost led to the disappearance of a contagious disease similar to leprosy in its terrible forms) became available to humanity purely through empiricism and not as the result of scientific investigations. Similarly, balneotherapy is of empiric origin; only recently, owing to the physiological researches of Winternitz and others and the application of physical chemistry, has it assumed the dignity of a separate branch of science. In consequence of a false point of view and empiricism the creative ideas of a Paracelsus were forgotten.

The progress in the chemistry of organic substances offered an opportunity to combine chemical and medical research, especially in the province of therapeutics.

I myself have had the pleasure of seeing that by this coöperation of medicine with organic chemistry an impulse has been given to therapeutics, which, in spite of a certain opposition, cannot again disappear from the sphere of research, an opinion which was held and expressed on the part of chemistry by the late A. W. von Hoffmann.

A good example is furnished by chloral, a drug formerly belonging to the chemical rarities, because Liebig's method of production provided no means of obtaining sufficient quantities for experimental medical research. This body was known as a chemical substance as early as 1832, but its intrinsic therapeutic value was not discovered until the year 1868. It is in America more than anywhere else that these investigations have received the fullest appreciation. The use of chloral hydrate was based upon the idea that when taken up into the blood a splitting off of chloroform takes place, as is the case outside the organism in the presence of all alkalies. This point has been the subject of much controversy. There can be absolutely no doubt that whenever chloral has had no soporific effect, a considerable quantity of urochloralic acid can be found in the urine, which must be traced back to the chloral. It is equally certain, however, that small quantities of urochloralic acid always are to be found in the urine after the administration of chloral. But it is just as true that the main therapeutic effect depends on the formation of chloroform. Only those who consider these principles will, as is shown by clinical experience, be able to observe chloral in the full unfolding of its effect. Shortly after its effect had become known the Glasgow clinician, Russel, proved that in conditions of excitement in typhoid fever, owing to the marked increase of the alkalinity of the tissues, small doses of chloral hydrate through their decomposition manifest the same effect as that produced only by large doses in similar conditions in other diseases. On the other hand, in gout the opposite happens. Even large doses do not produce the desired effect, since alkali is lacking for the decomposition.

But we cannot judge of all organic bodies from the standpoint of decomposition. Many take up substances from the organism, and since the discovery that benzoic acid becomes hippuric acid, and salicylic acid changes to salicyluric acid, it has been proved that the opposite of decomposition takes place with a number of drugs. Furthermore, it does not seem impossible that many substances unite with the disease-products formed in the organism. This hypothesis may be supported by the fact that the system itself

produces an acid, such as glycuronic acid, which carries off foreign substances from the organism, such as camphor, phenol, etc., in the form of a double combination.

Since the time that chloral came into use organic bodies have been particularly investigated. Owing to the tremendous amount of material there has been a tendency to place reliance upon the chemical composition in making a choice, and it has been assumed that the chemical constitution stands in a certain relation to the action of a drug. Many experiments have been made in this direction. We do not wish to deny that such an influence occasionally exists; at any rate, we see that when the action of a given substance is known changes in the molecule will produce a difference in action, and that by the introduction of certain groups, certain definite changes in the effect may be expected. Among this group of bodies is antipyrin, in which changes in the side-chains leave the nature of the effect pretty much the same, even though new therapeutic advantages are obtained, as is best seen in pyramidon. A similar example is offered by veronal, lately suggested by E. Fischer as a soporific.

But it is as yet impossible to predict the effect of a chemical body from its constitution, unless a decomposition-product of known action is formed, as in the case of chloral hydrate, or unless an active and well-known nucleus forms the basis of the substance. There are, of course, examples which point to the connection between constitution and effect, such as the difference between the action of bi- and trichlorinated aliphatic combinations. The trichlorinated bodies have a lethal influence on the heart; the bichlorinated bodies, such as chloride of ethyliden, only on the medulla oblongata. If trichlorinated butylaldehyde (butylchloral) be administered to an animal only an effect on the medulla oblongata is produced, in spite of the triple chlorination. The reason of this is that allylchloroform is formed in the organism, which, not being stable, splits up into dichlorallylen, which is a bichlorinated body.

Owing to the progress in chemistry medical science has been enabled to determine the relation which certain new drugs, by reason of their composition, bear to other established remedies of known constitution. This has been demonstrated by Gaetano Vinci in eucaine, whose composition is analogous to that of cocaine. Eucaine is a drug which is truly fitted to replace cocaine on account of its slighter poisonous nature, especially in the form of its lactic acid salt.

It has frequently been assumed that certain atomic groups in the molecule are the bearers of a special action, and that accordingly the bodies of a chemical series must exhibit a similar effect. That is, however, by no means the case, for even formic acid and acetic acid manifest markedly different biological properties. In alcohols the theory is founded on the presence of a certain chemical group, which is spoken of as the alcohol group. But we see this group appearing threefold in glycerin, and yet no physiological connection between the effect of common alcohol and of glycerin can be established.

In general we must confess, however, that we cannot as yet speak of a relation between constitution and effect, because what we call effect must be regarded as an influence on the different functions. Even if we consider the apparently so simple mechanism of sleep, we must remember that it may be induced by an influence on the brain, or equally as well by an action on the periphery. We cannot here enter into a physiological analysis of the processes taking place in the organism, but as the above example shows, the most diverse parts of the system may be affected, so as to produce a similar result. Moreover the different hypnotics, although fulfilling the same purpose, have an entirely different composition. On the other hand, when investigating the action of chemical substances we may always expect new results to become manifest by chance, for when Baumann was studying the effects of sulfonal it had never occurred to him that this body might possess soporific powers. We can best see the prominent part played here by chance in the introduction of salicylic acid into therapeutics. After Kolbe had succeeded in synthetically producing this acid, which is normally contained in the bark of the willow, he thought that it would exhibit disinfecting properties within the system by its decomposition. This decomposition does not, however, occur.

Yet Kolbe's idea has led to the clinical application of this substance, and the valuable results obtained by Stricker from the use of salicylic acid in acute articular rheumatism, although it is not by any means a specific, have stimulated to continuous researches, most fertile for therapeutics, upon the various salicylic preparations.

It is not impossible that, starting from this small therapeutic field, the indications for the use of salicylic preparations may be greatly extended.

Even though the constitution of a chemical body gives us no firm basis for pharmacodynamic investigations, we can yet derive the most varied hypotheses from it. In pharmacodynamic research we may uphold the same principle which Claude Bernard expresses, namely, that by promulgating a hypothesis we are led on to experimental research, the solution of which may be of the greatest importance. G. Gore expresses his opinion in much the same way:

"A discoverer is a tester of scientific ideas; he must not only be able to imagine likely hypotheses, and to select suitable ones for investigation, but, as hypotheses may be true or untrue, he must also be competent to invent appropriate experiments for testing them, and to devise the requisite apparatus and arrangements."

The science of therapeutics quite properly does not follow a one-sided course, but seeks aid in all directions, and since the results of the exact natural sciences are not yet ripe to guide us clearly, we must take into consideration what has been gained by practical experience, for it would be a false principle to condemn popular medicines without examination. At the beginning of this lecture the successful application of digitalis was already mentioned.

And here we must not entirely neglect the historical side of empiric observation. Frequently even the most absurd practices are based upon theory. When we turn away in disgust from the unclean excretory products of animals used in ancient times and by Asiatic nations, which we now regard as the very outcome of folly, we cannot ignore the fact that even this practice was founded on theory, though a false one. This is proved by Pliny, who tells us that animals eat and digest plants, but the medicinal part is not absorbed by the organism, but excreted, for which reason the feces contain substances curing human ills. These prejudices remained for centuries, as is proved by Paulini's book, published in 1697, but which can now be read only with disgust.

Such excretions as musk and castoreum, which are undoubtedly of value, should by no means be rejected. But particularly the 19th century has directed attention to the question, whether the products of the organs themselves, or certain substances contained therein, might not be employed as remedies.

It was no easy task for Brown-Sequard to prove that the principles contained in the testicle of animals exercise a stimulating and exciting influence on the system. The discovery of spermin crystals, their occurrence in various organs, and the decidedly stimulating effect produced by these substances, reminded physicians that creatin, which had already been obtained from meat extract, had an effect similar to that produced by the salts of potassium on the animal body. This, as we may say, weak connecting link yet led to the further development of a principle in therapeutics. Medical chemistry has already succeeded in obtaining from the organism substances which may be of the greatest importance for therapeutics. You all know the effect of thyreoidin on the system. Obviously the active principles here are albuminoid bodies, the peculiarity of which has already been partly explained by Baumann in that iodine is one of their component parts. Probably no one would have imagined that this element must be regarded as one of the constituents of the human organism.

The very much studied question of the constitution of albumen will naturally lead to a more exact knowledge of the different kinds of albumen which are of value therapeutically and open a new field of observation to pharmacology.

The most surprising feature in the action of substances of the organs is presented by the constituent of the suprarenal capsule, adrenalin, not an albuminoid body, it is true. In order to better illustrate the importance of the new domain, the following pharmacodynamic

experiment may be mentioned. Doses of cocaine which are absolutely fatal to animals are easily borne in the presence of adrenalin without any injurious effect whatsoever. These substances, as they are found in the body of animals, are certainly of importance for the life-processes themselves. Taken from the animal body, they have the same effect as the human product, and can thus be employed as curative agents in man.

But medical chemistry had already undertaken researches which were not indeed utilized therapeutically at once, but came to exert great influence on therapeutics. In 1869 Zuelzer and Sonnenschein proved that alkaloidal bodies may be formed by the decomposition of the organic substances of the organism, and later on the theory of toxins was derived from this observation. This again has led to von Behring's remarkable and far-reaching theory of the anti-bodies formed in the organism.

How to make the substances obtained from the bodies of animals useful for therapeutics, depends upon the state of our physiological and chemical knowledge, and especially on the train of ideas arising in connection with these subjects. This can be seen, for example, in the case of the esters of cholesterin, the composition of which was already discovered by Berthelot, but not in connection with biological investigations. On the other hand, cholesterin esters had been observed in the form of wool-fat, and the impure product was used medically and cosmetically even in ancient times for its curative powers. It was proved that a functional significance as regards the animal organism must be attributed to cholesterin esters, for they are present in mammals, birds, and all creatures whose external surface is of keratinous character. They give lustre to the skin, but act chiefly, so to say, as a protective varnish. The white substance of newborn children is therefore very properly termed cheesy varnish (vernix caseosa). It was formerly thought to consist of glycerin fat, but it is actually composed of cholesterin esters. The higher members of these esters are characterized by the physiological properties of wax. Gottstein has shown that this substance offers no food for microbes, is very stable, difficult to saponify, and not decomposed by the oxygen of the air, as are other fats. Thus it forms a protective matter, especially effective by reason of its waxy nature, and this has led to the production and application of therapeutic substances similar to cholesterin ester, as, for example, fetron.

The influence of pathological anatomy on therapeutics belongs entirely to the 19th century. To John Hunter in England and Bichat in France belongs the credit of freeing pathological anatomy from the brainless descriptive scientists, and of forming it into the necessary basis for every form of progress in therapeutics. From this time until Virchow's labors, the decisive importance of which is recognized impartially by all nations, pathological anatomy has exercised a great influence upon medical activity. Cellular pathology especially, in spite of all former battles and present attacks, will form the basis of every experimental and therapeutic observation, though some of the views concerning it may undergo modification through the progress of science, and opinions which Virchow himself could not accept may be brought forward again. The scientific question which appeared as a result of cellular pathology is the question of the cause and symptomatology of disease. Nothing can be more suitable in treating this question than to quote Virchow's own words:

"An elementary pathological process in the sense of cellular pathology appears thus: an external influence acts upon a living cell and alters it in a mechanical or chemical way. The external influence is the *causa externa,* or as we simply express it, *the cause of disease:* the altered condition is called passio, disease. If now, in consequence of the change undergone, an action (actio s. reactio) takes place in the living cell, this change is called a *state or irritation* (irritamentum), and the cause of disease irritants. If, on the other hand, no action ensues, if the condition is limited to the change "suffered" by the cell, we have to do with a mere disturbance (laesio) or *paralysis.* Since, however, the same cause can evoke irritation in one cell, merely a disturbance in another, and even paralysis in a third, we assume a certain difference of the internal arrangement to be the cause

of this varying behavior. Thus we come to the internal cause or predisposition."

But these words spoken in 1880 must be modified according to present experience. According to Virchow the causa externa is the cause of disease. The irritant acting upon the organism is *under all circumstances* the morbific factor according to this assumption. We do not wish to play with words. If, indeed, this foreign intruding agent produces a destruction of the cell power or a morbid modification of it, it obviously must be regarded as the actual cause of disease. But when, for instance, we see that the invading body produces only an entirely local irritation, or, although capable of reproduction, as is the case with bacteria, no proliferation occurs, it becomes difficult to consider the same factor as the cause of disease in all instances. Virchow terms this phenomenon of indolence of the cell toward the intruder a want of predisposition; according to the school of bacteriologists, however, the cell is not a culture medium in the given case. We see from this explanation that Virchow himself assumes the cell power to be variable, and we can quite logically and correctly say that by the term disease, *i.e.*, nosos, is designated that condition in which the external irritation can accomplish the defeat of the cell.

Von Hansemann has shown from a pathological and anatomical point of view that in cases of diabetes mellitus and other diseases the tubercle bacillus involves secondarily the lung. Von Hansemann calls this disposition, but we must certainly first of all term it nosos, since it is a question of proved deviation from the normal.

This can also be illustrated by experiments. In a frog anthrax bacteria do not proliferate. As soon, however, as we place the animal in an incubator, *i.e.*, weaken the cell power by heat, we are able to make the animal susceptible to the inoculation of anthrax. In this case the parasite is only a parasite of the diseased cell, and this kind of infection I have termed nosoparasitism. Thus we must describe as "nosos" the molecular change which we can no more observe through the microscope than we can the course of a chemical reaction, the outcome of which we judge only by the result.

The cell is subject to the same vital fluctuations as Brown has assumed for the organism. Brownonian theory has had no special value for practice, it is true, because at that time it was impossible to base a system of therapeutics on these observations so as to be of practical use. But it must be acknowledged that his theoretical deductions can be applied to the vitality of the cell. This theoretical explanation is under all circumstances of decisive importance for therapeutics, and already physicians are beginning to direct attention to this view in the study of therapeutics. Thus A. Menzer says: "The solution I have attempted to give to the question of the etiology of acute articular rheumatism is derived from the theory of a correctly interpreted nosoparasiticism."

This question has grown to be of special importance for pulmonary phthisis. We cannot here enter into the subject of infection by tubercle bacilli; only one thing is certain, namely, that the bacillus is destroyed if the cells become healthy and only does harm when the cells are diseased. Even before the discovery of the tubercle bacillus this fact was proved by dietetic and open-air cures, as described in the excellent work of the two Doctors Williams, father and son, and Freund again has shown lately that the functions of the tissue of the lungs are impaired by abnormal immobilization of the first rib, and that then the tubercle bacillus can begin its work.

At the present day pharmacodynamics teaches that there are indeed drugs which do not merely act specifically upon a tissue, as phosphorus acts upon the formation of bone, but that there are also cell excitants, such as cantharidin, which, without themselves having any effect on the bacteria, can bring about the cure of diseased tissues, so that the nosoparasitic bacilli are destroyed.

But here begins a branch of science which, like the theory of immunity and serum-therapy, occupied the end of the 19th century, and the waves of discussion still run so high that it is as yet unsuitable for a historical survey. It is sufficient to say that all the investigations of the present as well as of the past century afford us a guarantee that we are following the right road of progress in thera-

peutics, and assure us that in regard to the healing of disease there lie before us unlimited possibilities, to use the apt phrase which has been already employed in regard to the development of your country, by Ludwig Max Goldberger, "Das Land der unbegränzten Moeglichkeiten."

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*THE EFFECT UPON EDEMA OF ELATERIUM IN NON-PURGATIVE DOSES.**

By Henry Sewall, Ph.D., M.D.,
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While the clinician is, from the very nature of his material, for the most part debarred from the field of scientific experiment, nevertheless the facts developed in bedside study may often suggest a line of research to the laboratory worker. The few observations upon which the following paper is based will have a scientific value, if at all, in some future experimental demonstration of the hypothesis suggested by them.

Nothing is more curious in the history of that ancient and interesting drug elaterium than the paucity of published clinical, not to say experimental, studies on its mode of action.

Drugs which produce watery catharsis have taken on new interest in the light of recent researches upon osmosis and the physiology of lymph formation. A reference to the recent Harrington lectures on edema by Meltzer[1] will put any student at once in a position to weigh all current views of the subject from a critical standpoint.

It is ordinarily assumed, I think, that a cathartic drug given by mouth produces its effect through direct action upon the mucous membrane of the bowel. Brunton[2] in his review of the pharmacology of catharsis appears to support this view.

Cushny states:[3] "The action of the purgatives is generally considered purely local, and strictly analogous to that of the skin-irritants." Then, after considering certain exceptions: "Few of the purgatives have any appreciable action after absorption, but general effects may be produced indirectly from their intestinal action."

As long ago as 1857 Claude Bernard demonstrated that subcutaneous or intravenous injections of solutions of sodium sulphate caused purgation.[4] And lately J. B. MacCallum,[5] after renewed investigation of the physiological action of saline cathartics, finds that "all those salts which act as purgatives when introduced into the stomach or intestine have the same action when injected subcutaneously or intravenously." MacCallum found that, in rabbits, increased peristalsis could be caused by intravenous injection of salines within one minute which, were the salt thrown directly into the intestine, would only occur after ten to fifteen minutes, and with a dose five times the amount to produce an equal effect. "This seems to indicate," says MacCallum, "that even when these salts are introduced into the intestine they must be absorbed into the blood before they can produce their purgative effect, and that they affect the intestine by increasing the irritability of the nerves and muscles, as Loeb has suggested."

The problem of the pharmacology of cathartic drugs seems to fall naturally into two groups: First, what are the mechanisms involved? Secondly, what are their modes of action? The first question chiefly concerns us in this paper, and I venture to indicate the following obvious possibilities: (1) Cathartics, without being absorbed, may act only locally upon the surface of the intestinal epithelium, and the effects produced may or not involve reflex actions of the nervous system. (According to H. C. Wood,[6] previous section of the par vagum prevents the action of purgatives.) (2) Cathartics may exert their specific irritation only or chiefly during their passage

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*A paper read before the Section of Medicine of the International Congress of Science and Art, St. Louis, Sept. 23, 1904.

[1]Edema. By S. J. Meltzer, *American Medicine*, July 2, 1904, *et seq.*

[2]Pharmacology, Therapeutics, and Materia Medica, 1888, p. 390.

[3]Cushny: Pharmacology and Therapeutics, 1901, p. 94.

[4]Quoted by MacCallum, *infra.*

[5]J. B. MacCallum: "On the action of saline purgatives in rabbits, and the counteraction of their effect by calcium." *University of California Publications*, July 10, 1904.

[6]H. C. Wood: *American Journal of the Medical Sciences*, 1870, vol. lx, p. 75.

through the intestinal wall (*a*) during absorption, or (*b*) during excretion, and, in either case, by direct contact with appropriate tissues or reflexly through the nervous system. (3) Cathartics may act only after absorption into the general circulation, and on tissues other than those in the intestinal wall, especially, probably, the systemic capillaries.

Of quite another character appear to be the questions involving the mode of action of cathartics—whether, *e.g.*, induced diarrhea is due to increased secretion or only to retarded absorption and more vigorous peristalsis. Or the much deeper questions involved in the discrimination of the parts played, respectively, by osmosis and vital secretion (to beg a question) in catharsis.

It is probably the prevailing opinion that so-called "hydragogue" cathartics produce their watery flux solely through direct action upon the intestinal wall, and that the drying of the tissues and the absorption of dropsical effusions is a secondary and passive result in the systemic capillaries of increased density or dryness of the blood occasioned in the intestinal circulation. But it is open to conjecture that cathartic action *begins* with accelerated absorption in the systemic capillaries, leading to increased blood-pressure and lowered specific gravity of the blood, and that increased diuresis and intestinal flux and peristalsis are later links in the chain of circumstances. Indeed, my own clinical observations upon elaterium seem most readily explained by a hypothesis founded upon such a course of events. The hypothesis may be stated in advance as follows: *Elaterium has the power of causing the absorption of dropsical effusions irrespective of the loss of watery fluid from the blood to the bowel.* The proof of this statement is made more difficult, but its soundness is by no means impaired, by the common experience that the pharmacological measure which relieves dropsies usually causes diarrhea as well; nor is it here disputed that edematous fluid usually finds its principal avenue of escape from the body in the intestine.

It is unfortunate that my observations were made with the use of Clutterbuck's elaterium rather than with elaterin, the active principle of the drug.

The dosage employed varied according as the object sought was purgation or absorption of effusions without disturbance of the bowels.

In the first case results were obtained by the method advised by the elder Flint.[7] About one-tenth grain of elaterium was given by mouth every hour until nausea supervened or the bowels began to move. The number of doses effective on this basis varied between three and eight. In the second case the drug was administered frequently for several weeks continuously in doses of one-sixteenth to one-eighth grain given from one to three times daily. It usually happened that after a longer or shorter time nausea was produced. Upon this event the drug was at once stopped, or sufficiently reduced in amount to relieve the nausea. I never saw anything approaching prostration produced by the drug. These observations were mostly carried on at the Arapahoe, now the Denver, County Hospital of Denver.

My attention was first especially attracted to the properties of elaterium thirteen years ago, by reason of its happy action in the case of a man sixty-nine years of age, who suffered from great swelling of the legs, marked breathlessness, and other symptoms, chiefly dependent upon dilatation and probable degeneration of the heart muscle. On two or three successive days a small amount, 3/32 grain, of elaterium was ordered to be given hourly, not to exceed six doses. No effect was thus produced upon the dropsy or general symptoms. The drug was then ordered to be given every hour until nausea was produced or the bowels began to move. Eight doses were thus given during the latter part of one day. The next morning all signs of effusion had disappeared from the patient's legs, and his painful subjective symptoms were found to be completely relieved. The nurses in attendance certified that the patient's bowels had not moved more freely after the last series of elaterium doses than on previous days. The quantity of urine passed was, unfortunately, not recorded. This patient had formerly been treated with digitalis, ca-

[7] Flint: Practice of Medicine, 1886, pp. 872, 892, etc.

thartics, and diuretics with alternate improvement and relapse. After the effective dosage of elaterium he kept well during the remaining month of his stay in the hospital, receiving, it is true, digitalis and iron, which had, however, previously been of no great help.

The striking feature of this case was the suddenness of the disappearance of a large dropsical accumulation under a dosage of elaterium but little greater than that which had been previously ineffective. It looks as if there had been a cumulative action of the drug for several days. As the bowels were reported not to have moved excessively during the disappearance of the effusion, it is probable that the fluid made its escape chiefly through the kidneys, as in the following case:

A pale, slender girl about twelve years of age had long suffered from uncompensated mitral regurgitation, chiefly evidenced by extraordinary ascites and edema of the legs. Ordinary therapeutic measures were applied, with varying but diminishing success. A dosage of elaterium representing one-sixteenth of a grain two or three times a day was given without apparent effect for a period of several weeks. Suddenly the child developed moderate fever, she suffered difficulty in breathing, and it seemed as if dissolution from heart-strain were imminent. The clinical picture was suggestive of that presented by a patient succumbing to sudden loss of compensation accompanying a mitral stenosis. I had been quite familiar with the physical signs in this case, and I now found that with this attack there was a considerable increase in the area of heart dulness to the right of the sternum, and the heart was labored and very vigorous in its action. There was no sign of pericardial effusion. Within a single night the dropsy nearly completely disappeared, and in the morning the patient was, from her own standpoint, quite well again. The child's mother certified that diminution of the dropsy was accompanied by no unusual movements of the bowels, but that the patient had passed an extraordinary amount of urine during the night.

The study of this case convinced me that through some agency there had been suddenly set up an extraordinary activity of the absorbing mechanisms through which, on the one hand, the lymph spaces had been drained, and on the other the blood-vessels had been surcharged with a watery fluid, causing the heart to stagger under an unwonted load, which would no doubt have overwhelmed it had not the increased blood-pressure found a safety-valve through the kidneys. The fever accompanying the clinical crisis may possibly have been due to sudden flooding of the circulation with toxins dissolved in the dropsical fluid. Similarly I have observed uremic symptoms, as headache and nausea, make their appearance with the sudden absorption of an ascitic effusion in Bright's disease.

After an interval of many months, practically the same clinical history was repeated in this child, following the administration of elaterium for a period of several weeks. Though other drugs were given coincidentally with elaterium, through a process of exclusion there can be little doubt that the extraordinary results were due to the latter agent.

I have notes on twenty cases treated with elaterium for edema of various origins. In all but the relatively vigorous patients the drug was given in doses of but one-tenth grain from one to three times a day, and it was discontinued with the advent of nausea.

After a few days of such treatment a tuberculous patient suddenly lost a scrotal effusion, and in another edema of the feet disappeared. Out of twenty recorded cases elaterium disagreed—*i.e.*, produced nausea, or rarely griping—in about one-half. In most instances the diminution of dropsical accumulations under its influence was attended with purgation, and such cases are not available in this discussion. It may be remarked parenthetically that the favorable results secured through the use of elaterium supported by appropriate other treatment were of strikingly durable character.

To sum up the evidence offered in this paper:

1. The facts here presented seem most easily explained by assuming that elaterium, aside from its action on excretory functions of bowels and kidneys, directly excites absorption of fluid from the tissue spaces. Whether this effect is brought about by sudden increase of osmotic pres-

sure of the blood or through some specific stimulation of the capillary epithelia through which endosmosis is accelerated, is a question for definite investigation.

2. The action of elaterium seems to be "cumulative" over considerable intervals of time. One or two small doses daily may finally produce a physiological effect or give rise to intolerance.

3. The drug may appropriately be used in most cases of edema, barring those in which there is a tendency toward enteritis.

4. If it is attempted to obtain therapeutic results without inducing nausea or griping, as in the observations recorded above, elaterium will be found irregular and unreliable in its action. Possibly better results would follow the use of its active principle elaterin.

THE TREATMENT OF PULMONARY HEMORRHAGE.

In the *Medical Record* of September 17, 1904, McLAUGHLIN states that it is the duty of the physician to adopt those measures which will assist in the formation of a clot as promptly as possible, and to prevent the dislodgment of the clot, once formed, until sufficient time has elapsed for the eroded vessel to become permanently occluded.

To meet these indications one must decrease the reflex irritability of the lung tissue, and limit the respiratory excursions of the side from which the hemorrhage is coming. The reflex irritability may be controlled by many drugs, among which the bromides and chloral are in high repute. The author's preference is for opium, as it is not only without a peer as a cough controller, but it lessens tissue metabolism, renders less oxygen necessary, and so reduces the amount of work which the lung has to do. In comparison with these advantages the theoretical disadvantage of raising the arterial tension is not to be considered.

To limit the respiratory excursions there is no measure more efficient than strapping the side of the chest from which the hemorrhage is coming. The adhesive straps should be applied with considerable pressure during forced expiration, and should cover the entire half of the chest from the axillary fold to the lower costal margin, the same rules which govern the application of straps in fracture of the rib governing here.

The advantages of this method are:

1. It favors the formation of a clot around the bleeding point, thus assisting in the prompt control of the hemorrhage.

2. It prevents the clot from becoming loosened or dislodged, thus preventing the recurrence of a hemorrhage once controlled.

3. The clot in lieu of being formed in lung tissue which is on the stretch is formed in lung tissue which is relaxed; it follows, therefore, that there is less interference with the general nutrition of the lung, and less likelihood that the existing hemorrhagic infiltration will be followed by septic processes in the lung itself.

4. Upon removal of the straps the expansion of that side of the chest, and the consequent expansion of the air vessels of the contained lung, will loosen up and favor the expulsion of any clots which may remain in the lung.

The question as to whether this method would increase or decrease the danger of inundating the bronchi with blood is one which only experience can decide. While it is undoubtedly true that opium by decreasing the general reflex irritability would tend to allow the accumulation of blood, the same cannot be said of this procedure. The decreased movement would, to a certain extent, favor its occurrence on the side from which the hemorrhage was coming, but this usually occurs anyway; *per contra,* the increased respiratory excursions of the unstrapped side would favor the expulsion of any blood which might enter the bronchi of that side.

The author's routine treatment has been as follows: Immediately upon the occurrence of the hemorrhage the patient is given a hypodermic injection of 1/100 grain nitroglycerin and ¼ grain morphine. The adhesive straps are then applied to the side of the chest from which the hemorrhage is coming, and the patient is instructed to lie upon that side. Six hours after, if the hemorrhage has ceased, the patient is moved out to a summer-house (a building with no sides, and which is practically out-of-doors). At the end of four days the straps are removed, and the patient is given a week of rest cure in the open.

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Leading Articles.

PHYSIOLOGICAL SALT SOLUTION.

It is an interesting and remarkable fact in connection with therapeutics that the profession in many instances discovers more or less competent methods of treating disease before it has knowledge of the physiological or pathological conditions which underlie the state presented to the clinician. A few years ago we knew little more about the blood than that it contained various forms of corpuscles, that it possessed certain ingredients which resulted in coagulation, and that its coloring matter was hemoglobin. Within the last few years we have learned much concerning the relationship of the constitution of the blood plasma to the blood-vessel walls and surrounding tissues, and we have learned that changes in the blood serum are very much more important, from a pathological standpoint, than changes in the corpuscles themselves. Under the leadership of Ehrlich and a host of other investigators who have worked along similar lines, it has been shown that the blood plasma contains a multitude of other powers heretofore far beyond our knowledge, and the old conception of the blood as a vital fluid possesses a new meaning to the modern physiologist.

At about the time that we began to obtain a better conception of the physiology of the blood plasma, the employment of so-called physiological salt solutions by hypodermic injection, or intravenously, began to be popular, and these solutions are now kept in almost every well appointed hospital for the support of the circulation in dangerous operations, and for the dilution and elimination of poisons in a number of toxic conditions. Those physicians and surgeons who in their early days had an adequate training in physiological laboratories recognized from the first that it was essential that these solutions should be carefully prepared, and that the quantity of saline material which they contain ought to be exact, while others in the profession who did not receive such training not infrequently have been content to employ solutions the ingredients of which varied very greatly at times, and as a consequence often failed to get good results and sometimes met with evil effects. In the past many physicians have considered that the normal salt solution, so-called, which has been used for years in the physiological laboratory, when experimenting upon the circulation of the frog, in the strength of 0.6 per cent, was also a normal salt solution for human beings, when, as a matter of fact, a solution very much stronger than this is correct, and it may be stated as a fact that 0.9 per cent is approximately that which should be employed when salt solutions are used for mankind. Again, our increasing knowledge in regard to the constituents of the blood serum and its relationship to adjacent tissues has proved that the mere use of salt and water alone is not sufficient, if the best results are to be obtained, since such a solution lacks certain ingredients which are necessary for normal physiological function in the circulatory apparatus.

Our attention has been called once more to this important matter by a valuable article contributed by Dr. Frank S. Mathews to the *Annals of Surgery* for August, 1904. As he well says, it needs

no argument to show that a fluid should be used which will not interfere with the performance of the blood's function nor injure the body cells, and he quotes the well known physiological fact that if a saline solution which is too concentrated is employed the red cells shrink, while if it is too dilute they first swell and then part with their hemoglobin, and that these changes are the result of osmosis. He found that when blood is mixed with .9-per-cent saline solution, the corpuscles remain normal; when .6 per cent is employed, they swell and lose some of their hemoglobin; and when .5-per-cent solution is used, the corpuscles are destroyed. Yet how many surgeons who employ salt solutions at the present day recognize that these differences in concentration may make the difference of saving the life of the blood or destroying it. He then quotes Cushing, of Baltimore, who found that when a .6-per-cent solution was passed through the blood-vessels of a frog, the muscles of its legs lost their irritability sooner than if no circulation had been maintained.

Many years ago in Ludwig's laboratory in Leipsic the writer of this editorial performed experiments along these lines both on frogs and warm-blooded animals, and the changes which took place in the vitality of the muscles supplied by varying strengths of salt solution were remarkable, not only as to function but as to the anatomical states, for if weak solutions were circulated the muscle fibers became pale and exceedingly swollen, while if stronger ones were employed they became shrunken through the extraction of fluid.

It being evident, therefore, that an absolutely correct percentage is essential if salt solutions are to be employed, we may pass on to a consideration of the various salts, in addition to sodium chloride, which are necessary. Many years ago Dr. Sydney Ringer in London found by accident, and proved by careful experiment, that a small quantity of calcium was essential to the satisfactory use of a sodium chloride solution. Later than this Loeb, Howell, Locke, and others have shown, with Ringer, that calcium and potassium are both essential, and Howell has concluded that the sodium maintains the proper osmotic relations between the cells and the fluid, that the calcium is a stimulating agent to the heart and muscle, and that potassium is essential to its rhythmical contraction and relaxation.

For these reasons we earnestly plead with surgeons and physicians that they shall not be content to employ salt solutions prepared by haphazard methods. It is vitally important that these solutions shall be most accurately prepared, not only because they will fail to be of benefit if they are carelessly used, but also because the physician may do actual damage and impair his patient's chances of recovery if such care is not followed.

In addition to the effects which may be exercised upon the blood and its serum, it is interesting to note that Brown has shown that the use of pure sodium chloride solutions is not infrequently followed by glycosuria, whereas if calcium is added to the solution such a leakage of sugar does not take place. The old rule, therefore, that the normal salt solution may be made by adding a teaspoonful of common salt to a pint of water ought never to be followed if it can be avoided. Mathews also believes, and we heartily agree with him, that when large quantities of fluid are used in the peritoneal cavity, calcium and potassium should be present in addition to sodium chloride in normal quantities.

Several years ago we suggested to the largest manufacturers of preparations for physicians that they should place upon the market a concentrated saline solution containing the ingredients recommended by Ringer as modified by Dr. Locke. This was done, and at the present time it is possible for every physician and surgeon to have in his surgical kit bottles of this fluid, from which the so-called physiological salt solution can be instantly prepared of such a strength as to be capable of doing good and incapable of doing harm. We urge our readers, therefore, to bear in mind the fact that an incorrectly prepared salt solution is capable of doing more damage to a patient than the use of active drugs which are manifestly of uncertain constitution.

THE VALUE OF TUBERCULIN.

On several occasions during the past three years we have printed in the editorial columns of the THERAPEUTIC GAZETTE

our views in regard to this important matter, and have at other times printed in our original pages articles which have invariably strongly supported the employment of tuberculin, both as a diagnostic and therapeutic agent. Our own editorials have been guarded, and in one sense antagonistic to its use on the part of the general practitioner. There can be no doubt that in the great majority of cases of tuberculosis it is possible by careful watching and careful physical examination to reach a positive diagnosis that a patient has or has not this type of affection without relying upon the injection of tuberculin. Most of those who have used this substance, to a sufficient degree to be considered experts in its employment, admit that it is an agent of very great power, that it must be used with caution, and that there are fallacies connected with its use. In other words, no physician has a right because a patient reacts after injecting tuberculin to state positively that he has tuberculosis, nor is he correct in stating positively, upon this basis alone, when no reaction occurs, that the patient is absolutely free from tubercular disease.

Amongst those who have advocated within certain lines the employment of tuberculin, both as a diagnostic and therapeutic agent, there is no one who deserves and receives the confidence of the profession more than Dr. E. L. Trudeau, of Saranac Lake, who has not only based his views upon a large clinical experience, but has had them indorsed by his experimental researches.

In the *Journal of Medical Research* for August, 1904, Dr. Trudeau writes a paper, with the assistance of Dr. Baldwin and Dr. Kinghorn, upon the subject of "Tuberculin Reaction." These gentlemen have investigated several important points concerning the influence of this substance. First, the effect of tuberculin in spreading the disease. Using rabbits for their investigation, they found that when local tuberculosis in the eye is produced by inoculation, the administration of tuberculin failed to result in any spread of the malady, but on the contrary seemed to exercise a favorable and absorptive influence upon the diseased focus. The number and the methods of their experiments scarcely seem to justify our reaching a positive opinion that the use of tuberculin never spreads the disease, but the results are indicative. We wish that there had been more experiments designed to study the influence of tuberculin upon tuberculosis involving other organs from which it could be more readily disseminated. As some persons have claimed that one of the disadvantages of tuberculin was the danger of its spreading the disease, this line of research is not only most interesting but of great clinical value.

The second point which they endeavored to determine was the effect of removal of a tuberculous focus upon the tuberculin reaction. They found that the extirpation of such a focus was followed by loss of reaction, but their experiments were not sufficiently numerous to make this certain.

In regard to the question, "Is the reaction always dependent upon the presence of specific tubercles?" they reach an affirmative conclusion.

A very interesting point which they have also investigated deals with the question, "How long after infection with tubercle bacilli does susceptibility to reaction begin?" As a result they believe that a period of ten to fifteen days is required, since the mere presence of tubercle bacilli in the body prior to the formation of actual tubercles does not give the reaction.

The fact that these experiments have been carried out upon animals whose natural temperature variations are considerable, and that in some instances the tests were not very numerous, necessitates hesitation in the absolute acceptance of the conclusions reached, but the care with which Dr. Trudeau carries out all his investigations, and his thorough acquaintance with the subject, provides us at the present time with the best information that we have in regard to these very important questions. We hope that time and opportunity will permit a further continuance of this most suggestive line of research.

THE USE OF COPPER SULPHATE FOR PURIFYING DRINKING-WATER.

There is probably no subject of greater interest to the physician and the public at the present time than the methods which can be employed for the purification of large quantities of water which are to be employed for domestic purposes.

Whether the water comes from a well, a cistern, a spring, or a river, there is always a possibility that it may be contaminated by pathogenic germs, and there can be no doubt that the vast majority of cases of typhoid fever and cholera are due to such contamination. The fact that there exists to-day no germ-proof filter which can be employed for the purification of large quantities of water, in the sense that the water will be sterile after it has passed through the filter, forces us to regard with interest the results of a research which has been carried out through many months in the government laboratories in the Department of Agriculture in Washington by Dr. Moore and his assistants. Primarily and chiefly their experiments were directed toward the discovery of an agent which would destroy those minute forms of life which not uncommonly cause a water-supply to be disagreeable and offensive, even if it be not unhealthy. It was essential in this research, as in all others of a similar character, that the substance employed should be incapable of doing harm to fish, to animals, or to the human beings who afterwards drank it, since manifestly it would be improper to introduce any substance which was deleterious. Dr. Moore and his assistants found that the introduction of infinitesimal quantities of copper sulphate served to totally destroy all forms of algæ, and incidentally, because their research was not directed primarily against pathogenic organisms, he also found that copper sulphate in these infinitesimal quantities was capable of destroying the typhoid bacillus. These observations having come to the knowledge of Dr. Martin, the Director of Public Health and Charities in the city of Philadelphia, this official had instituted a series of experiments to control those published in Washington, with results which are in entire accord with the government conclusions, and which are remarkable in more ways than one. Thus, it was found that the introduction of so small a quantity of sulphate of copper as from 1 to 8,000,000 to 1 to 1,000,000 of water totally destroyed typhoid bacilli within a few hours.

The value of this discovery if further research supports it consists not only in the fact that we have at hand a ready means of purifying water and destroying its most common pathogenic organism, but that this purification can be attained by the employment of so small a quantity of sulphate of copper as to make the method cheap, and therefore practical, and also absolutely innocuous so far as human beings are concerned.

It has also been discovered in the bacteriological laboratories of the city of Philadelphia, as indeed it was discovered by Dr. Moore in Washington, that the mere placing of contaminated water in a copper vessel, the interior of which had been well cleaned with sand and acid, also resulted in the destruction of the organism. Thus, if water containing many thousand typhoid bacilli to a cubic centimeter is placed in such a copper vessel, at the end of fifteen minutes the number of organisms is diminished, and this diminution in their numbers is continued until at the end of three hours not a single organism can be found. Whether this result is produced by some infinitesimal quantity of copper or by some unknown electrical condition which the copper may induce is not known.

It is interesting to note that within the last few months this very extraordinary method has been applied to the water-supply of a small town in New Hampshire. The reservoir supplying this town contained about 60,000,000 gallons of water. Twenty-five pounds of copper was placed in a sack, and this was hung over the stern of a rowboat, which was then propelled from one end of the reservoir to the other. A round trip completely dissolved the copper in the bag. Repeated trips of this character made at intervals of 25 feet, until 275 pounds of copper sulphate were dissolved, caused the water to be entirely sterile in a few hours, and it remained so for many days thereafter, notwithstanding the presence of additional water which entered the reservoir to take the place of that which was withdrawn.

As there are no cases of copper poisoning on record from small quantities of this substance, a valuable discovery has been made if further investigations confirm these results. In the meantime no harm but much good can come from the use of copper vessels as water-containers, and in the employment of copper sulphate by the method here described.

ANESTHESIA—USE OF EUCAINE B AND ADRENALIN IN LOCAL ANESTHESIA.

It has been abundantly proven that the addition of adrenalin chloride to solutions of eucaine and cocaine not only intensifies the immediate anesthetic effects of the latter drugs, but greatly prolongs their action, thus making possible the carrying out of elaborate procedures under the use of a comparatively small quantity of injected solution. It should be remembered in this relation that Braun has shown that a comparatively large quantity of cocaine can be introduced into tissues which have been rendered ischemic by adrenalin without risk of a general poisoning from absorption.

Braun has noted that minute quantities of adrenalin have the desired effect, and that if used in too strong solution it is probable that the larger vessels as well as the capillaries will be constricted, and may at a later period give rise to hemorrhage. It is therefore desirable to use solutions which only act on the smaller arteries and capillaries, thus allowing the hemorrhage which occurs in the larger vessels to be detected and permanently guarded against at the time of operation.

In using the infiltration method, Braun advised the addition to 100 cubic centimeters of one-per-cent eucaine beta solution of not more than five drops of 1:1000 adrenalin chloride solution. For injection into the larger nerve trunks he uses a one-per-cent solution of eucaine beta to one cubic centimeter of which is added two minims of adrenalin solution.

The enthusiastic claims made by Braun were abundantly corroborated by Barker, as has been pointed out in these pages. He used adrenalin chloride (P., D. & Co.) so added to a solution of eucaine in normal salt as to make the resultant mixture contain 1/100,000 adrenalin and 1/500 beta eucaine.

Donitz, by injecting a mixture of adrenalin chloride and cocaine into the subdural space, was able to perform in animals most severe operations, and he believes that the combined drugs are safer than either used alone.

The great objection to the application of this method is incident to the fact that there is some difficulty in preventing the decomposition of the adrenalin when it is mixed with other solutions and exposed to light, nor have the solid preparations thus far put upon the market entirely removed this difficulty. However, solutions freshly made up are always to be preferred, and the addition of five minims of adrenalin chloride and one grain of eucaine to the ounce of normal salt solution is readily and quickly accomplished.

POSTOPERATIVE VOMITING.

Exhausting and sometimes fatal postoperative vomiting, much commoner in the days when the anesthetic was administered by the youngest and least experienced house surgeon than now, when it is usually given by an experienced man, still occurs occasionally in spite of every precaution taken against it. For years it has been treated by drugs, the beneficial effect of which is dependent upon the fact that the vomiting is as a rule self-limited, provided the strength of the patient holds out.

White (*Annals of Surgery*, August, 1904) has been led to a more careful study of the subject by two cases resulting fatally, in both of which sepsis was positively excluded. The ingenious theories of autointoxication, lessened cell resistance, atony of the stomach with increased toxicity of its contents and gastric elimination, seem to be corroborated by the capillary hemorrhages found in and beneath the gastric mucous membrane in cases which have resulted fatally. If the theory of these obstinate cases of vomiting thus outlined is sound, lavage should prove a useful remedy, and this has been the case in White's experience.

The stomach is washed out immediately before the antiseptic is stopped and before the patient leaves the table—while he is thoroughly under the anesthetic. A mouth-gag separates the jaws, the head resting upon the occiput. The tube is inserted well back against the pharynx and gently pushed down into the esophagus until the end enters the stomach, usually indicated by a mark eighteen inches from the end of the tube. This varies but slightly. Occasionally there is spasm, which is best overcome by a steady pressure. Salt solution or sterile water is

poured into the funnel held about two feet above the patient, until a pint and a half or two pints have been used. Then the funnel is inverted close to a bucket upon the floor. At the same time the patient's head is rotated toward the right. This process is repeated once or twice until the fluid returns clear.

Although lavage does not abolish postoperative vomiting, it seems to lessen it.

This form of treatment is especially indicated where there has been insufficient time to prepare the patient, where anesthesia lasts an hour or longer, and where before operation the patient has suffered from attacks of nausea and vomiting, and chronic gastritis. It is contraindicated in operations upon young children.

Where obstinate vomiting occurs in spite of lavage, small doses of morphine and heroin are usually efficient, supplemented at times by washing out the stomach with boric acid solution. The most efficient preventive measure, however, is the selection of an experienced man for the administration of the anesthetic.

TOTAL ENUCLEATION OF THE PROSTATE.

To those at all familiar with the prostatic literature of the last years, Freyer's (*Lancet,* July 23, 1904) enthusiastic advocacy of suprapubic enucleation of the prostate gland for affections of the bladder and kidneys incident to obstruction due to enlargement of this gland is sufficiently familiar. He offers a further contribution to the knowledge on this subject by an analysis of 110 cases of total enucleation, and shows how the modern surgeon has been led to this extremely radical procedure by the failure of the various palliative operations, including partial prostatectomy and the galvanocautery under this heading. He has accomplished a permanent relief, and shows a mortality materially better than that following the less radical operation.

This observer points out that the commonly accepted view of the prostate as a single body with a canal tunneled through it in the form of the prostatic urethra is incorrect. There are twin organs, of apparently purely sexual function, the lateral lobes, which, though welded together to form one mass, remain practically as distinct as the testes. Each of the two glandular bodies is enveloped by a strong, thin, fibrous capsule; and it is these capsules that constitute the true capsule of the prostate regarded as a whole.

This capsule extends over the entire organ, except along the anterior and posterior commissures or bridges of tissue that unite the lateral lobes in front of and behind the urethra. This true capsule cannot be removed from the prostatic mass except by dissection. The ejaculatory ducts do not penetrate the capsules of the lobes, but pass forward in the interlobular tissue to open into the urethra.

The prostate is further encased in a second capsule or sheath, formed by the rectovesical fascia. Embedded in this fascia lies the prostatic plexus of veins, most marked in front and on the sides of the prostate.

In most cases the enlargement of the prostate of declining years is adenomatous, numerous encapsulated tumors being found, invariably enclosed within the true capsule, which is pushed before them.

The ideal operation consists of enucleating the enlarged prostate entire in its true capsule out of the enclosing sheath, leaving the urethra with its accompanying structures behind; though the prostatic urethra may be torn partially or even entirely removed with equally good final result.

To accomplish this operation, suprapubic cystotomy is performed, after first thoroughly washing out the bladder with antiseptic lotion. The large catheter which is employed for this washing is left *in situ.* The forefinger of one hand is introduced through the wound. The finger of the other hand is introduced into the rectum to render the prostate prominent in the bladder and to keep it steady. The mucous membrane over the most prominent portion of one lateral lobe or over the so-called middle lobe, if there be but one prominence, is scored through by the sharpened finger-nail, and gradually detached by it from the prominent portion of the prostate in the bladder. This means simply raising of the mucous membrane, immediately beneath which is found the true capsule. Keeping the finger-point in close contact with the

capsule, the enucleation of the prostate out of the enveloping sheath outside the bladder is proceeded with by insinuating the finger-tip in succession behind, outside, and in front of one lateral lobe, thus separating the capsule from the sheath. The finger is then swept in a circular fashion from without inward, in front, and to the inner side of the lobe, detaching this from the urethra, which is felt covering the catheter, and pushed forward toward the symphysis between the lateral lobes. These, as a rule, will have separated along their anterior commissure in the course of the manipulation. The other lobe is attacked and treated in the same manner. The finger is next pushed well downward behind the prostate, and the inferior surface of the gland pulled off the triangular ligament. When the prostate is pulled from within its sheath and separated from the urethra with the finger in the rectum, aided by that in the bladder, it is pushed into the bladder through the opening in the mucous membrane, and is withdrawn by strong forceps through the suprapubic wound. As a rule there is very little bleeding, which is readily controlled by irrigation with hot lotion through the catheter.

A stout drainage-tube is placed in the bladder through the suprapubic wound for a few days. The bladder is irrigated daily with antiseptic lotion through the drainage-tube. No catheter is left in the urethra.

Of 110 cases operated upon by Freyer, the average age was a little over sixty-eight years. The average weight of the prostate removed was 3¼ ounces. Three of the prostates removed had already undergone malignant degeneration; 107 benign cases were successful in all but 10. In no instance did the patient fail to regain the power of voluntary micturition without the aid of the catheter.

There have been no instances of relapse, no contraction at the seat of operation leading to a stricture, and no history of permanent fistula. Considering that in nearly all the cases the urine was septic, and in many cases putrid, but two instances of septicemia are distinctly creditable.

There were 10 deaths in connection with the 107 operations—two from mania after the wounds had practically healed, one from heat-stroke on the tenth day when the patient was convalescent, one from coma due to retention of morbid products of the urine which had set in several days before the operation, one from pneumonia seven days after the operation, one from heart failure six hours after the operation, the patient having been worn out (seventy-four years old) from fifteen years' suffering, one from advanced interstitial nephritis ten days after operation, one suddenly from heart failure twelve days after operation, and two from septicemia 13 to 165 days after operation. The total mortality was about nine per cent, which is less than that from lithotomy in all ages.

Reports on Therapeutic Progress

THE TREATMENT OF ECZEMA.

LASSAR (*Dermatologische Zeitschrift*, Berlin, 1904) states that the simplest conception of eczema—more correctly of the eczemas—is as the reaction of the epidermis-bearing surface against inadequate tissue irritation. As this is manifold in its nature, and the pathological results of irritation are not uniform, the essential unity of the essence of the disease disappears, and with it the possibility of laying down a constant method of treatment. Thus one must inquire as to the cause of every cutaneous inflammation resembling eczema, and adopt a corresponding symptomatic treatment. A carbolic or lysol eczema in a surgeon demands other treatment than the impetiginous eczema of infants evoked by scratching. Eczema may manifest almost every variety of morbid change, and does not follow the customary scheme of redness, papulation, and pustulation, the formal advance of symptoms in regular stages. One observer finds a naturally arising or experimentally induced eczema completely bacteria-free, while others as competent have certainly proved the existence of a bacterially infectious variety. The pathological type, due to chemico-physical traumatisms, rapidly alters under the unavoidable influence of microörganismal contamination. Purely parasitic inflammations (set up by fission fungi) disturb the surface and give rise

to exudations, change the general condition of the tissues, lay bare the previously protected lymph canals, so that various chemical substances from without make their way in. Lymphangitic inflammations ensue, which render the course of eczema so tiresome and its treatment difficult.

The first indication is, in the case of any existing eczema, to inquire carefully into its original character, the one form before infection and the infectious form prior to its further progress, and the tissue disturbances which favor its absence. We need often to search for a long time ere we discover the actual cause of the constant recurrence of the cutaneous inflammation, attributed to a something in the constitution or the blood. For instance, it may be turpentine employed to cleanse brushes by artists, or for other purifying purposes. Lysol or lysoform may be mentioned, which, from their recognized efficacy, have gained a great reputation, yet are borne well by all skins. Other causes are mouth-washes, as odol, or hair-dyes. From such may arise ring-shaped erythema round the mouth, or bands of infiltration on the forehead and temples. By disuse of such articles of daily employment, by the discovery of concealed external irritants, a spontaneous cure frequently results. Aggravation of numerous cases is owing to the patient attempting to treat himself, all the more apt to happen since dermatotherapeutics have passed for the most part into the hands of specialists.

The main indication for special treatment is to preserve the irritated parts from further harm. If the dermatitis is recent —one almost always induced by some external irritant—it is necessary carefully to purify the surface. This is carried out in a warm bath with the addition of bran and a bland, never a medicated, soap, or by fomenting with infusion of chamomile flowers, which has the advantage of being both aseptic and antiseptic after a mild fashion. Then the affected parts are to be enveloped for half an hour, three times a day, in compresses moistened with a 1-in-1000 watery solution of sulphate of zinc. The compresses are to be replaced by fresh ones so soon as they become warm, which for convenience can be laid out on flat plates. This alternation of evaporating fomentation and cooling contraction imitates the natural activity of the absorbing capillaries, and is grateful to the patient. Directly on the moist follows the dry treatment, which consists in the free application of a simple dusting powder, the cheapest and most serviceable being a fine, pure talc, which from its unctuousness serves the desired object of absorption and protection by far the best. If itching is a prominent feature, then 1 to 2 per cent of carbolic acid; if burning, from ½ to 1 per cent of menthol may be added. Iodoform, orthoform, and bismuth are alike inadmissible. In this way the exudation, if present, can no longer serve as a nutritive medium for bacteria; their deposition is prevented. So by the establishment of a protective layer, frequently renewed and kept in position by bandages, the damaged, and for the time permeable, epidermis is replaced, till again regenerated. This procedure in time renders the skin dry. Its smoothness can be restored, if a paste composed of oxide of zinc 60 and olive oil 40 parts be thickly smeared on, dusted over with talc on the trunk, covered with cotton-wool and a light bandage on the limbs. In the morning the face is best cleansed with olive oil. By such simple measures fresh irritation is avoided. The means themselves cannot irritate, while they obviate infection by the medium of the bacterially contaminated nails, or by rubbing or scraping, so prejudicial to healing.

Should superficial pustulation occur, each follicular pustule should be opened with a fine aseptic knife, compresses moistened with acetate of alumina are to be applied, and later the author's well known vaselin-starch paste. For the parasitic forms, if superficial, the same paste, with the addition of 10 to 20 per cent of sulphur, is most efficient. When deeper infiltrations are present, success is hardly possible without tar. The crusted eczema of the face in children can be rapidly cured if managed as follows: It must be carefully cleansed, oiled over, then washed—without so much friction as to occasion bleeding; then thickly smeared with a salve of olei rusci, sulphuris sublimati, ää grammes 15; vaselini, saponis domestici, ää grammes 30; cretæ albæ, grammes 10; M., powder and bandage.

Finally, the *x*-rays cautiously used are of great value.—*Edinburgh Medical Journal,* July, 1904.

EXERCISES FOR PARKINSON'S DISEASE.

In the *Cornell University Medical College Reports,* vol. i, DANA advises the use of the following exercises in this malady. The object of these exercises is to overcome a tendency to weakeness and stiffness of the affected groups of muscles; the result being in general that he has a tendency to bend forward too much, to raise the feet too little, to keep the knees bent, to take too short steps, to keep the elbows too closely to the sides, and the forearms and first phalanges flexed too much. All this can be helped by careful attention to the exercises. The patient should accustom himself to go through these exercises three times daily, devoting to them ten minutes, sometimes less, never more. He should go through them with the greatest possible care and precision, using every effort to contract the muscles in the proper direction, and resting often.

EXERCISES FOR WALKING.

1. The patient should walk up and down the room taking long steps, at least twenty-eight inches to a stride, and taking forty steps. Rest.

2. The patient, having learned to take long steps, should walk with the eyes fixed on a point on the ceiling directly over the top of his head as he walks. This obliges him to throw the head back and the shoulders back. He should take long steps, walking in this way forty paces. Rest.

3. The patient should next learn to turn around rapidly. He should walk in the manner just indicated for ten steps, promptly turn around and walk backward, and repeat this four times.

Patient rests.

EXERCISES FOR THE ARMS.

4. The patient should take a pair of wooden dumb-bells, stand erect, raise them from his side above and back of the head, touching them together. Do this five times. Holding the dumb-bells out straight in front of him he should carry them back as far as possible in a horizontal line. Do this five times.

5. Patient standing erect opens the hands, extending them as far back as possible, stretches out the arms and carries them high above his head, and back as far as he can, as though about to attempt to fly. This motion should be repeated twenty times, the patient holding the head well back and looking at the ceiling.

6. Take a light pair of Indian clubs and swing them around full arm length, each one about twenty times.

7. Patient puts the hand flat upon the table, places a weight of about one-half pound upon the fingers and raises it up ten times with each hand.

8. To stop tremor patient should carry a rubber ball in the hand. By gradually working his hand upon it he can stop the tremor for considerable periods of time.

9. Writing and the drawing of lines and figures can usually be done well, but movements such as lead to forming letters and figures can be introduced into this exercise.

10. Exercise to fatigue does harm.

11. After exercise a short, very hot bath, followed by rubbing, is most beneficial.

THE "FORMAL" TREATMENT OF EPILEPSY.

In the *Publications of Cornell University Medical School,* vol. i, DANA after advising that a certain class of epileptics be treated in institutions says that for the others who cannot be so treated the following plan is desirable:

1. The regulation of the daily life. The patient must, as far as possible, live like a normal individual, and even at some risk be allowed some of the pleasures and indulgences of youth and adolescence. Some study, or some systematic work, if it is only domestic, must be given. Let him go to school for a part of the day, or take special lessons; and if possible let him acquire some musical or artistic accomplishment or learn some handicraft, if it is only making beds and cooking.

2. Exercise and bathing. Three times a week, or even six times if the patient is strong, he must take some very active exercise for twenty to thirty minutes, sufficient to make the perspiration pour out profusely. In the country chop or saw

wood, or ride a wheel; in the city it must often be only pulling weights, or swinging clubs, or boxing, or fencing. When this cannot or will not be done, have the patient get a "hot box," and thrice weekly take a sweat in it followed by a cool ablution or shower. This is usually best done about 5 P.M.; then a rest is taken until the time of the evening meal. Three times a week the patient should take a short (one-half to one minute), very hot full bath, 98° to 108°. While in the bath the patient must move about, rubbing his limbs. The bath is followed by a sponge-off with lukewarm water. This hot bath should be taken in the evening. A cool sponge bath in the morning is often agreeable but not necessary. When the patient cannot or will not take the active exercise and hot box, order a hot full bath every night, but the exercise, in most cases, should be considered vitally important. The object of all these things is to secure a very free action of the skin, muscles, and liver. They will be given with more impunity and greater effect. The patient must be impressed with the need of carrying out these measures with the utmost care.

3. Diet. There is no specific for epileptics. They should have a simple mixed diet, with meat only twice a day, and that in moderation. Many epileptics overeat or eat too fast; many have some digestive disturbances and are constipated. Occasionally one sees brilliant temporary results from a milk diet, or flushing the rectum, or by injections of oil. The digestive tract must be watched most closely; but epilepsy is not an intestinal intoxication, and is not cured by medication along these lines. A diet list, however, should be given, and a laxative prescribed once a fortnight—*e.g.*, the old compound rhubarb pill, alternating with ten grains of blue pill, followed by a teaspoonful of Rochelle salts in a glass of Vichy. The non-saline diet, so far as the writer has observed, gives no results.

4. Operations. Removal of reflex causes and contributing stomach disorders. There is little use in wasting much time on the reflex causes of epilepsy. Much is written of them, but practically they do not exist. Epilepsy is a (usually) progressive degenerative disease of central origin, and due to some congenital defect. If alcohol or syphilis or trauma of the brain is an element in the case—and they very rarely are—such elements must be looked after. The eyes should be examined and errors corrected, because this makes the patient more comfortable. The same is true of sexual and pelvic irritations, but the writer has never observed a case really benefited by operation for phimosis or removal of the ovaries. Any operation, however, may stop the paroxysms for a few weeks or months.

In Jacksonian or symptomatic epilepsy cranial operations are indicated, but in no other cases except in certain imbeciles, when linear craniotomies often give palliative results.

5. Medicines. The basal medication is, alas, bromides. The average daily dose for a person above fourteen is 60 grains. The writer has found the best adjuvant, by all odds, to be the glycerophosphate of soda, which should be given in doses of 30 grains daily. The standard prescription is:

℞ Aq. sol. glycero-sodii phosphat. (50 per cent), f℥ij;
Sodii bromidi, ℥iij;
Aquæ, q. s. ad f℥vj.
M. Sig.: One drachm twice a day in water A.M. and P.M., 6 days in 7.

As will be seen the medicine is given only twice a day, which practice lessens the amount of time devoted to drugs and makes the patient more free during the day. Another important point is that one day, and in some cases two days, in the week all bromide medication is stopped. On this day, usually a Sunday, the patient devotes his time to cleansing his alimentary tract. Saturday night a slight laxative is given (the author uses once a month a mercurial); on Sunday a tumbler of hot water with 30 grains of bicarbonate of soda is drank slowly half an hour before each meal. After each meal an acid tonic is given containing

℞ Tinct. ferri chloridi (1 year old), f℥viij;
Acid. sulphuric. dil., f℥iv;
Glycerole pepsin, f℥viij;
Aquæ, f℥ij;
Olei menth. pip., min. v.
M. Sig: 15 to 25 minims well diluted or dropped in capsules after each meal.

By this means the digestive organs are toned up, and some of the anemia caused by bromide is corrected. In mild cases or those well under control this remission treatment is carried out twice a week, Wednesdays and Sundays.

Usually the above treatment lessens greatly and largely controls the attacks. Sometimes it is necessary to give one-half or even a whole dose of the bromide phosphate mixture in addition at noon; sometimes an extra dose is given on Saturdays.

6. Increase of medication as the patient improves. Epileptic crises usually occur if the disease runs a natural course two or three times a month, often several attacks occurring together. If these attacks are suppressed for three months and the patient begins to feel secure, he should, in the fourth month, have the doses increased 25 per cent. Then they can be dropped to the former average and again increased. The better and the more secure the patient feels the more stringent should be the watch and the larger the dose. For we must secure what we have gained, or start all over again. After a year's remission it is especially important to increase the medication and the general care of the patient, and for two months he must be kept under the strictest surveillance. Then the regimen can be relaxed for a half year, but again and again the patient must be held up with a close rein. In this way alone can we save them. We feel some relief after fourteen months, some security after two years, and finally strong confidence after three years. Much can be done with the epileptic if he is intelligent and coöperates with the physician; or oftener if the mother is patient and watchful—happily most mothers are of this kind, and to them, if the child is not a backward degenerate and has not been wasting too many years in haphazard work, one can promise much. By this the author means that in 5 to 10 per cent the attacks can be suppressed, and in 50 per cent or more they can be controlled, so that the patient can live a comfortable and useful life.

This treatment consists, then: (1) In short, violent exercise that works and hardens the muscles, stimulates the liver, and opens the pores of the skin. (2) A regular system of stomach-washing, so to speak, with laxatives regularly given to unload the bowel of toxins and excess of fecal matter. (3) Regular cold bathing to stimulate the vasomotor system, and a regular series of full hot baths and sweat baths to unload the skin. (4) Administration of bromides in maximum doses but given with regular intermissions, so as to rest the stomach and allow its keeping in good condition. (5) Associating with bromides the phosphates, and often iron, to combat the depressing effect of bromides and its tendency to impoverish the blood. (6) Increase of medicine as the patient gets better.

HAY-FEVER: SOME PRACTICAL SUGGESTIONS AS TO ITS MANAGEMENT AND TREATMENT.

Parsons writes in the *Medical Record* of July 16, 1904, on this topic. He says that aside from medical treatment, one of the best methods of obtaining relief from the disagreeable symptoms of hay-fever is the cold spinal douche, for from fifteen to thirty seconds, at a pressure of from twenty to thirty pounds to the square inch, at a temperature of 60°. This acts as a powerful tonic to the central nervous system. It also relieves the congestion in the nose in a reflex manner, by inducing the contraction of the capillaries in the nasal mucous membrane. The beneficial effects thus obtained may last for two or three hours, or longer. The cold plunge, shower, or cold sponging may be used, but the results obtained are not so favorable nor so lasting. There are few patients who cannot soon become accustomed to the douche, if properly administered and followed by a brisk rub. If an apparatus for giving the douche is not at hand, water from a pail should be dashed over the patient's back, the operator standing at a distance.

Another excellent method of obtaining considerable relief from the nasal congestion and asthma is the use of the ice-bag. The ice-bag is to be partially filled with cracked ice, the pieces being about as large as a white walnut, and then applied to the back of the neck and the upper fourth of the spine. The ice-bag should be kept in this position for ten or fifteen minutes, and then removed. If the application is made as above directed, the relief of the symptoms characteristic of hay-fever is very marked and lasts for several hours. It may be used two or three times a day without untoward symptoms. If applied at night before retiring, the nasal and asthmatic symptoms will be much relieved, so that the

patient will be able to get several hours' quiet sleep.

A large number of hay-fever patients find a change of climate beneficial. Most patients are greatly improved by a sojourn in the mountains, and some obtain absolute relief. Others find benefit at the seashore, and by bathing in the ocean. The benefit derived from the surf bathing is not merely due to the stimulant and astringent effect of the salt water, but also to the force with which the water enters the nostrils, acting in a mechanical way, by inducing the contraction of the capillaries and dilated veins. The beneficial effect resulting from a bath in the surf is often marked and lasts for hours. Care must be taken, however, not to remain in the water too long, or after the patient begins to feel chilly, for by so doing the results sought for will not be obtained to their highest degree.

The ocular symptoms in hay-fever are often very annoying. There is apt to be more or less conjunctivitis, which may be rendered more intense by strong sunlight and the irritation of dust. There may be considerable lacrimation and the secretion may be very irritating. For this it is well to use Agnew's eye-water three times a day (boric acid 10 grs., camphor 1 oz.). The author also recommends that hay-fever patients wear tinted glasses during the active period of the exacerbation, as at times the reflex action of the bright sunlight on the eyes induces attacks of sneezing, which still further increases the nasal congestion. They also protect the eyes to some extent from irritating dust.

In the treatment of hay-fever we should avoid the use of opium in any form. It should be used only as a last resort, and after all the other means, above advocated, have been given a fair trial.

It is also recommended that the use of cocaine be avoided. We should always bear in mind that the cocaine habit may be formed by its use in a spray. In a large number of cases it will be found that the use of the suprarenal gland, both internally and locally, will give as much relief as was formerly obtained by the use of cocaine.

Patients should be advised to abstain from the use of tobacco during the exacerbation of hay-fever. It has a tendency to produce irritation of the mucous membrane of the respiratory tract and to aggravate any chronic inflammatory condition that may exist.

We should also advise our patients not to indulge in alcoholic stimulants.

In giving directions to our hay-fever patients concerning their diet, mode of life, etc., it will be well to instruct them to avoid walking too fast and getting overheated, especially if the weather be warm and damp or foggy, as under these circumstances asthmatic symptoms are apt to be aggravated. They should also be cautioned against cooling off too quickly, or exposing themselves to draughts.

Patients should be advised to avoid driving in the dust as discomfort is experienced thereby, such as a paroxysm of sneezing and increased nasal congestion. The writer observed one case, and has been informed of another, in which the smell of the sweat from the horse when out driving would cause great nasal congestion and discomfort. The first of these patients could ride in a trolley car or railway car without discomfort, showing that it was not merely the dust that set up the irritation.

MEDICAL TREATMENT IN TUBERCULOSIS.

In the *Colorado Medical Journal* for March, 1904, ZEDERBAUM gives advice as to the medical treatment of tuberculosis. He says that hemoptysis usually takes its own course with the patient being kept quiet in bed, and mostly does not require active interference. Sometimes a saline physic will check the bleeding sooner than anything else. Among the drugs prescribed in this emergency the author prefers the old combination of extract of opium with lead acetate, ½ grain of each, with about 10 to 15 grains of powdered rhubarb. It is astonishing how much of the opiates a bleeding consumptive can sometimes introduce into his system without being subject to the unpleasant after-effects of this otherwise not indifferent drug.

Opium in the same doses, or 5 grains of Dover's powder, with 10 grains of bismuth subnitrate, often also helps to check the obstinate diarrhea of consump-

tives. Another grateful means of conquering this specific diarrhea is the administration of very small enemata with tannic acid and laudanum suspended in corn-starch water. About an ounce or two of the liquid should be used, and repeated every three to four hours until the desired effect has been obtained.

Nausea, and the uncomfortable sensations from the stomach in general, which so often make the consumptive wretched, and are due partly to the involuntary swallowing of the sputum, partly to the effects of toxins, can be overcome by lavage, cocaine, or large doses of bicarbonate of soda with chloroform water and bitter almond water.

Insomnia and nervousness yield often to strontium bromide, or any other of the bromides, but the first named is preferable, as it affects the stomach less. Codeine is also valuable when ordered to be taken at bedtime. The author always uses large doses. They work more surely, and in his experience at least they have never been followed by untoward effects.

A consumptive has to be reminded to keep his bowels open. The writer's cathartic is pulvis glycyrrhizæ compositus; he also prescribes cascara sagrada in a mixture with strychnine, and either compound tincture of gentian or iron chloride tincture. This is a good tonic worth remembering.

A delicate task in the management of a consumptive is the treatment of his cough. It is often difficult to decide *a priori* whether the annoying cough is of benefit to the patient or not. One might think that where the bronchial tubes appear to be invested with an excess of moisture the rational treatment ought to consist of promoting the cough, and consequently the expectoration. The more would seem the better in such a condition, but that is not always the case. The patient may expectorate profusely, and yet not do well at all; on the contrary, he is actually suffering from the constant strain, and keeps up a febrile temperature. The author has found that under the circumstances a narcotic combined with a mild expectorant helps the patient wonderfully. A very useful combination to answer the purpose has proven to be a mixture consisting of dionin gr. 8, apomorphine or tartar emetic gr. 1, syr. altheæ and water to make 4 ounces; a teaspoonful three to four times a day, and an extra dose at night, if required. This mixture is especially of value when the cough interferes with the night rest of the patient. In general, the character and significance of the cough should be carefully studied before attempting to prescribe for it. In some cases the treatment of the nasal cavity, or of the pharynx and larynx, will check an obstinate cough where the best combinations of expectorants, with or without narcotics, have proved entirely useless.

FALLING OF THE HAIR.

McDONNELL contributes to the *Journal of the American Medical Association* of July 16, 1904, the following advice about the treatment of this state:

After the scalp has been thoroughly cleansed by the shampoo, the following formula is to be used:

℞ Acidi salicylici, 1.0;
Sulphuris præcipitati, 2.5;
Unguenti aqua rosæ, 25.0.
M.

The patient is directed to part the hair, and then to rub in a small portion of the ointment along the part, working it well into the scalp at the roots of the hairs. Then another part is made parallel to the first, and more ointment rubbed in. Thus a series of first longitudinal and then transverse parts are made, until the whole scalp has been well anointed. Done in this way, it is not necessary to smear up the whole shaft of the hair, but only to reach the hair roots and the sebaceous glands, where the trouble is located. This process is thoroughly performed for six successive nights, and the seventh night another shampoo is taken. The eighth night the inunctions are commenced again, and this programme is continued for six weeks. In almost every case the production of dandruff is checked completely after six weeks' treatment, and the hair, which may have been falling out rapidly before, begins to take firmer root. To be sure many hairs which are on the point of falling when treatment is begun will fall anyway, and it may even seem for a time as if the treatment were increasing the hair-fall, on account of the

mechanical dislodgement of such hairs, but this need never alarm one.

After six weeks of such treatment the shampoo may be taken less frequently—say once in a fortnight. Yet when one thinks of it there seems every reason why the scalp, which offers such an easy lodgment for dust and dirt of all kinds, and which itself is casting off effete products surely as rapidly as the rest of the body, should be washed at least as often as the other parts of the body.

By such treatment, then, we have removed all dandruff, and by the reducing action of the sulphur on the sebaceous glands have checked its further production for a time.

Next to dandruff perhaps the most common cause of early loss of hair is heredity. In some families all of the male members, or all who resemble one particular ancestor, lose their hair early. Dark-haired families and races, as a rule, become bald earlier than those with light hair. At first thought it would seem as though nothing could be done to prevent premature baldness when heredity is the cause, but this is a mistake. Careful hygiene of the scalp will often counterbalance hereditary predisposition for a number of years, and even after the hair has actually begun to fall proper stimulation will, to a certain extent, and for a limited time, often restore to the hair its pristine thickness and strength. Any of the rubefacients may be prescribed for this purpose for daily use, such as croton oil, 1½ per cent; tincture of cantharides, 15 per cent; oil of cinnamon, 40 per cent; tincture of capsicum, 15 per cent; oil of mustard, 1 per cent; or any one of a dozen others. Tincture of capsicum is one of the best, and for a routine prescription the following has served well:

℞ Resorcini, 5.0
Tincture capsici, 15.0
Olei ricini, 10.0
Alcoholis, q. s. ad 100.0
Olei rosæ, q. s.
M.

It is to be recommended that the stimulant be changed from time to time, so as not to rely on any one to the exclusion of others. Jaborandi, oxygen gas, quinine, and other agents have enjoyed a great reputation as hair-producers for a time, and have then taken their proper position as aids, but not specifics, in restoring the hair.

It is a well known fact that after many fevers, especially those accompanied by great depression, such as pneumonia, typhoid, puerperal, or scarlet fever, the hair is very liable to fall out during convalescence. This is brought about in a variety of ways: In scarlatina the hair papilla shares in the general desquamation; in typhoid and the other fevers the baldness may be the result either of the excessive seborrhea, which often accompanies these diseases, or may be caused by the general lowering of nutrition of the body. Unless the hair-fall be accompanied by considerable dandruff (in which case the above mentioned treatment should be vigorously employed), the ordinary hygiene of the scalp will result in a restoration of the hair in most cases, but the employment of moderate local stimulation, with the use of good general tonics, will hasten this end. It seems unwise to cut the hair of women short in these cases, because the baldness is practically never complete, and a certain proportion of the hairs will retain firm root. These may be augmented by a switch made of the hair which has fallen out, until the new hairs shall have grown long enough to do up well. In this way all of that oftentimes most annoying short-hair period is avoided.

EPISTAXIS AND ITS TREATMENT.

In the *Charlotte Medical Journal* for July, 1904, TILLEY suggests proceeding somewhat in the following way:

1. Soak a small pledget of sterilized absorbent wool, about one inch long, half an inch broad, and a quarter of an inch thick, in equal parts of a 10-per-cent solution of cocaine and 1-in-1000 adrenalin chloride. Pass this into the nostril and place it against the septum parallel with the floor of the nose, so that only the anterior third of the pledget is visible from the outside (*i.e.*, without the use of a speculum). Now gently compress the nostrils with the fingers for five minutes.

2. If you have not the above remedies at hand, dissolve twenty grains of antipyrin in half an ounce of solution of witch-hazel and use in the same manner.

3. Failing these, soak the wool in lemon juice and insert it as above. If

you cannot even get lemon juice try moistening the wool with turpentine.

In a large proportion of cases these measures will check the bleeding, and the small wool plug may be left in the nose for twenty-four hours and then gently removed.

Should hemorrhage recur after a short interval, it may be necessary to adopt measures for more permanently sealing up the weak spot in the vessel wall, and we may pass in the following way from the simpler to the more complex methods:

1. Dilate the nostril with a suitable speculum, and apply to the vessel wall a 10-per-cent solution of cocaine. Wait for five minutes. Now apply to the bleeding point a probe coated with solid nitrate of silver and hold it in position for two minutes. Remove it gently, and to the whitened spot apply a small quantity of carbolized vaselin. Place a loose wool dressing in the nostril for a few hours. Chromic and monochloracetic acid may be applied in the same way.

2. If you possess a galvanocautery, apply this at a dull-red heat to the bleeding point, and remember that at the first moment of application you may start a bleeding which you desired to stop, and therefore it is well to adopt means for protecting the patient's clothes from being soiled. To the small slough produced by the cautery it is well to apply a little carbolized glycerin.

3. Should these methods fail (and they may do so in exceptional cases where the bleeding is more general, and comes not only from the usual situation on the septum but also from the floor of the nose and the anterior end of the inferior turbinal bone), you should pack the nose with a soft strip of gauze soaked in adrenalin chloride or even hazeline. The ribbon gauze should be about one inch in breadth and packed in gently for about two inches distance, and from the floor of the nasal cavity upward. A clotting will rapidly take place in the meshes and the bleeding will cease. The packing may be left for twenty-four to thirty-six hours.

Immediate checking of violent hemorrhage may sometimes be secured by Rose's epistaxis tampon, a thin gutta-percha, conical bag which can be inflated with air after it has been passed into the nose, and air retained by means of a stop-cock.

The author prefers the methods advocated before the last mentioned, because they are quite as reliable and are generally accessible.

It may be our experience to meet with almost intractable cases of epistaxis in which all the above remedies either fail or only succeed for a short while. In such circumstances Hunter Mackenzie has practiced with success the dissecting up of the mucous membrane of the anterior part of the septum, followed by gentle packing of the nose.

When nasal hemorrhage follows intranasal operations some form of plugging through the anterior nares will generally be relied upon.

For the sake of the physician's reputation as well as for the comfort of the patient the author advises the avoidance of three things:

1. The application of strong preparations of iron to the inside of the nose. They cause much discomfort and are not more effectual than less irritating chemicals.

2. Distending the vestibule or entrance of the nose with large plugs of cotton-wool or lint, which do not touch the bleeding point and only render the patient exceedingly uncomfortable.

3. The use of Bellocq's sound and the postnasal plug. If the physician possesses that instrument let him give it to a friend interested in medical museums. In the author's experience of ten years he has never met a case of epistaxis which needed it. If the physician will only find the bleeding spot and apply his remedies as advised, he will not subject his patient to the horrible discomfort and very real dangers of septic otitis media which posterior plugging of the nares involves.

Finally, the persistence and severity of epistaxis is often promoted by the rapid heart action which is encouraged in many cases by the patient's anxiety and mental disquiet, and to overcome this the physician should rely upon two valuable remedies: (1) the assurance which he should be able to give that all will be well; (2) the administration of a narcotic, an excellent form for this type of case being the deodorized laudanum in combination with the bromides.

EYE-STRAIN: THE IMPORTANCE OF ITS DETECTION AND CORRECTION IN ALL GENERAL NERVOUS DERANGEMENTS.

HOBBS in the *Charlotte Medical Journal* for July, 1904, advises that a mydriatic should be used in eye-strain to suspend the accommodation in all cases under forty years of age, and this he thinks is now the generally accepted opinion. But when the patient's time has been limited he has sometimes tried to measure and correct these errors by resorting to some mydriatic, of a modified strength, or to none at all, but neither means has proved satisfactory to himself, nor even to the patient after a short time has passed. To make such tests and corrections properly requires usually a week or ten days, and even two weeks is best to be sure of the results, as it is quite as important to be sure of the optician's work, after the refraction prescription has been decided upon. The author's optician knows that he always sees and passes upon all lenses and frame fittings that he makes by his prescriptions.

The muscles that control the movements of the eyeballs get their incentive for action, for the most part, by involution, and they act not only in pairs, but as a rule in double pairs, yet the quickness of their movements exceeds, probably, that of any other system of muscles in the body. Hence the inaction, or out of action, of one or more of these muscles is soon felt, especially when, as is usually the case, there is some coincident refraction error.

Every doctor has had his cases of functional nervous reflexes, each with its own particular phases. Usually such cases are periodic in their manifestations, yet sometimes they are continuous. But when he has eliminated every probable cause for such a reflex, and the patient persistently returns, he very naturally gets tired of it and enters the case in his note-book as a "nervous crank." Finally he concludes to suggest only rest and seclusion, which is probably the first really good advice he has given his patient, presupposing that, by exclusion, there could be nothing left but eye-strain as the cause. So when rest and seclusion has given the nagged and out-of-gear eye muscles a little time to recuperate, and the nervous manifestations are in abeyance for a time, the doctor has his cue for an eye-strain; then when he has accurately corrected it and finds that all the nervous reflexes have disappeared, he will be almost as much delighted as the patient, but he will be even more surprised.

The importance of correcting astigmatism, particularly when out of the rule, and still more so when it is associated with any form of "heterophoria," is so much more apparent each year that he urges all medical men to give such cases a more careful thought, and a more accurate investigation.

DENVER AND PULMONARY TUBERCULOSIS.

According to BEGGS, in the *Colorado Medical Journal* for March, 1904, there are certain classes which should not be sent to Denver. They may be classified as follows:

1. Phthisis florida in any stage. No climate is specific against tuberculosis, and no climate will rescue such cases from inevitable death.

2. Cases in which there is not sufficient lung substance left to perform the additional work of respiration imposed by the rarefaction of the air. It is estimated that the respired volume of the air at this elevation must be one-sixth more than at the sea level in order to furnish the same amount of oxygen to the blood. While normally there is considerably more lung substance than is necessary for the performance of the respiratory function, this gradually disappears with the encroachments of the tubercular process, and in high altitudes the surplus, being smaller, is exhausted earlier. Cases so affected, if sent away from home at all, should be recommended to a lower altitude than this.

3. Those individuals in whom the character or extent of the pulmonary lesions furnish no contraindications to high-altitude treatment, but who are unwilling to submit themselves to the self-control and hygienic conditions necessarily imposed by their condition. Many individuals go to a health resort expecting the climate to do everything for them, and consequently yield to imprudence of the most varied kinds, which they would not dream

of indulging in at home. They will not do well, and are lulled into a sense of false security by their surroundings.

No patient should be sent away from home on account of this without being referred to some trustworthy practitioner of the locality to which he is directed. As far as possible, chance should be eliminated from further interference with the case. The writer frequently meets individuals whose treatment is still being controlled from a distance by the physicians they were in the habit of consulting at their former homes. These same physicians would not for a moment think of trying to treat a case of pneumonia or typhoid fever a thousand miles away. Tuberculosis, while usually not so rapid in its course, requires no less careful consideration and observation of its progress. Treatment by mail is not in accord with the patient's best interests. The competent practitioner at a health resort of any kind is a far better judge of the availability of local therapeutic agencies and the modifications most suited to the individual case than any physician possibly can be who is situated at a distance.

In conclusion, the writer quotes from the work of C. T. Williams on "Aero-Therapeutics," the Lumleian Lectures for 1893. He says, concerning Colorado: "With regard to the actual results of the climate it undoubtedly produces great improvement in seventy-five per cent of the cases of phthisis generally, and in forty-three per cent it causes more or less complete arrest of the tuberculous process."

THE ANTAGONISM OF STRYCHNINE AND ALCOHOL.

FRENCH asserts his confidence in this antagonism in *Merck's Archives* for July, 1904. He believes the most important of the drugs employed for chronic alcoholism is strychnine. Its well known properties point the way to its use in this disease. It is the most powerful nerve tonic known to the medical profession. It acts upon the entire nervous system, but with a special tendency to the spinal nerves and the cardiac, respiratory, and vasomotor centers. It not only renders the mind more clear and active, but even seems to strengthen the will-power. It increases intestinal peristalsis, and aids elimination. Briefly stated, its basic action is almost exactly antagonistic to that of alcohol. It is a tonic and true stimulant, as opposed to an anesthetic and a paralyzant.

The system of the inebriate is relaxed in every part, paralyzed in greater or less degree, unable to carry on its functions properly. Mentally and physically the drunkard is dull, nerveless, incapable. The essence of his condition is that he has lost the power to control himself. He lacks the vigor and endurance that once were his. His mind is dulled, and his moral sense is weakened.

It is in such a condition as this that strychnine has its proper field of action. By its use the tissues are revivified. As a part of its effect, every nerve and muscle is keyed to its highest pitch. The mind acts more clearly, and the man is raised out of his soddenness and indifference. The world takes on fresh colors, and life assumes a new interest. The feeling of depression and inability gives way to one of lightness and elasticity. The terrible craving for alcohol, the dull, horrible gnawing at the stomach, that fearful, all-gone sensation, which in the drunkard's previous experience was only to be relieved by more alcohol, now begins to grow less and soon disappears entirely, while in its place there comes a sense of well-being, of elevation, of ability, of the power to accomplish, which is so unlike that false sense of confidence which comes with the first glass of an intoxicant, and so far superior to it, that the man no longer seeks to drown his grief in alcohol. His appetite for this is gone, and he no longer seeks or desires that for which but yesterday he would have periled body and soul. All these effects have been brought about by the action of strychnine in antagonizing those of alcohol.

These convictions were formed as the result of several years of special experience in the sanitarium treatment of alcoholism, and have but been deepened by the observations of similar effects in private practice during the years that have followed.

As specially illustrating the counteracting effect of the two drugs, the author recalls the case of a man who was a hard drinker and possessed of an ungovern-

able appetite, and who yet had left enough manhood and ambition to be anxious to be free from his bondage. He was undergoing treatment by the tonic method, the main element in which was strychnine, while at the same time he was allowed to drink as long and as much as he desired, in the belief that this method would produce the most satisfactory results. It was perhaps largely his experience with this patient that led the author afterward to modify this plan, and assure every patient that the less whiskey he drank, and the sooner he got through with it, the better it would be for him, and the more satisfactory would be the final result of his treatment. For three weeks this man continued to drink to excess, notwithstanding the fact that he "could not keep it down." In fact, while the sickening effect produced by apomorphine was especially well marked, the antagonistic effect of the strychnine, upon which alone is any reliance placed for a true curative action, seemed not to be in any way manifest. At the end of this time the patient was told by the author that he should be obliged to taper off his whiskey, and withdraw it wholly in three days. No sooner was the whiskey reduced than the effects of the strychnine were made manifest, and at the end of the three days his desire for whiskey was entirely gone. The next day he still had no desire for liquor, and the following one he could not have been driven to take it. Nor has he ever, from that day to this, either drank or desired to drink any more alcohol, though ten years have now passed, and he has been for several years the liquor officer of his town.

TUBERCULOSIS OF THE LARYNX.

In the *Colorado Medical Journal* for March, 1904, WAXHAM quotes Theodore Heryng, of Warsaw, who gives the following conclusions:

1. Tuberculosis of the larynx can heal itself without any local treatment.

2. The chief indications in the treatment of laryngeal tuberculosis, which is almost invariably associated with tubercular disease of the lungs, are hygienic, dietetic, and climatic.

3. The most important indication is the removal of the dysphagia.

4. The second, equally important, indication touches the special cases in which the breathing becomes difficult and symptoms of stenosis appear on account of tubercular infiltration and proliferation products.

5. The third indication has to do with the recovery of the impaired or lost voice.

6. The healing of deep ulcers of the larynx resting on inflammatory infiltrations surrounded by proliferation products and certain forms of chronic laryngeal tubercle is effected quickest by scraping, or rather removal of the tubercular tissue.

7. The surgical treatment is indicated: (*a*) In tubercular tumors of the epiglottis; (*b*) in circumscribed chronic infiltration of the posterior wall of the larynx; (*c*) in chronic tumors which resist all other methods of treatment; (*d*) in partial disease of the larynx.

8. Surgical treatment is contraindicated: (*a*) In advanced phthisis of the lungs with hectic and wasting; (*b*) in diffuse miliary tubercle of the larynx or larynx and pharynx; (*c*) in all cachectic conditions; (*d*) in severe cases of stenosis caused by inflammatory swelling of the affected parts; in these cases tracheotomy must be performed as soon as possible; (*e*) in patients exhibiting fear and nervous excitability.

9. With the proper application of cocaine the operation itself is not painful.

10. Pyoktanin (½- to 2-per-cent solution) has proved a very good means of preventing inflammation of parts operated upon. It must be applied to the surface of the wound twice a day.

11. Recurrence takes place frequently.

12. Nearly the whole of the upper part of the larynx is accessible to surgical treatment.

13. In spite of successful operation the disease may return.

14. The conditions for success of the surgical treatment in general depend: (*a*) On the local character of the infection, its extension, and its nature; (*b*) on the general state of the patient, his nutrition, and strength; (*c*) on the anatomical character of the affection of the lungs; (*d*) on the age of the patient, his profession, constitution, temperament, and character; (*e*) on the thoroughness of the operation itself; (*f*) on the careful after-

treatment and the capability of the patient to submit to a prolonged dietetic and climatic treatment.

15. It is difficult to establish a prognosis.

16. Serious bleeding after operation is rare. It can be stopped by the application of a mixture of lactic acid and solution of perchloride of iron, equal parts.

17. The want of success is often due to the disease being recognized too late for treatment.

18. Surgical treatment requires thorough knowledge of the operation.

19. Bad cases ought to be treated in climatic establishments.

BICARBONATE OF SODIUM IN THE DRESSING OF WOUNDS.

MILLER advises the use of this substance in the *Medical Summary* for July, 1904. As he well says, every practitioner is called upon to treat cases of burns, slight injuries, and abrasions. He feels that he is competent to suggest a number of agents which can be used in various ways for the dressing of such lesions. Many agents can be used, but the question as to their value often presents itself to the physician when he notes the course of the condition. The author's general surgical work has always brought him in contact with a great many minor injuries, and where a lesion is produced by trauma, heat, or chemicals, he has found as an excellent dressing various strengths of bicarbonate of sodium. This common and inexpensive chemical is an agent which, if used properly, will prove exceedingly valuable to promote the formation of healthy granulations after an injury which leaves a surface denuded, and the most valuable feature of such dressings is that there is little tendency on the part of the granulations to become unhealthy, even though considerable time must pass before the epithelial cells can cover the denuded area from the margins.

The bicarbonate of sodium was recommended some time ago to be used in pure form in the dressing of the wounds subsequent to the operation for bubo, but after a trial of the pure drug the author found it convenient to return to applications of salves containing from four to twelve per cent of the drug. The objection to the pure drug was that it was too stimulating and caused discomfort to the patient, which was undesirable where a large area was covered with the agent.

The most convenient vehicle for the bicarbonate is vaselin, and in surgical practice the author recommends that all practitioners prepare this salve or dressing, and see that it is dispensed in a sterile condition. The physician should always remember that vaselin is easily sterilized, and whenever there is a possibility of a jar of this drug being infected, if it is allowed to stand in boiling water for a time it will be effectually sterilized.

In using bicarbonate of sodium as a dressing in vaselin, the mixture should contain from 20 to 60 grains of the drug to the ounce.

The author has also had recourse with satisfaction, in more than one instance, to solutions of this drug as a wash and wet dressing, and recommends that the general practitioner more often utilize this agent in various ways rather than more expensive and less efficient agents.

TREATMENT OF LOBAR PNEUMONIA IN THE ADULT.

DUKEMAN contributes to the *Medical News* of July 16, 1904, an article in which he points out that by the time the physician is called to see a patient with an attack of pneumonia the pneumococcus has invaded every avenue, and as there is at present no reliable or trustworthy antipneumococcic serum, we must confine our treatment to meet indications as presented, and we must therefore be prepared to meet promptly any emergency that may arise. It is advisable, therefore, at once to order to be delivered to the sick-room a 200-gallon tank of oxygen, one ounce aromatic spirits of ammonia, one ounce tincture digitalis, mustard plasters, and a cotton jacket to be made and put on the patient as soon as completed. The patient is placed in a large, airy room with plenty of sunlight, the bed so arranged as to keep the patient out of draughts, for we require in this disease a free circulation of fresh, pure air both day and night. If the temperature is too cold, artificial heat is supplied to keep the temperature of the room at about 65° F., and a good nurse in constant attendance; no one else

should be allowed in the sick-chamber; quiet and rest are essential to recovery.

The existing toxemia calls for our first attention, and could we but rid the system completely of this toxemia many of the serious symptoms which we may be called upon later to combat would be greatly modified or would not ensue.

To combat the toxemia, the skin and the bowels are the main avenues through which this may best be accomplished. If called to see the patient in the first stages, the skin must be acted on, not by the administration of drugs internally, but by opening up the pores by giving a good sponge bath of hot water, using plenty of soap, and then giving a hot foot-bath containing mustard. This latter can best be accomplished while the patient remains in bed well covered, by the placing of a small tub containing hot water and mustard under the blankets, and with the knees flexed and feet in the tub, the blankets are well tucked around him. At the same time the author administers a large draught of hot lemonade, which very materially aids free perspiration. The patient is to remain in the above position for one-half to one hour, when free perspiration takes place. He is to sweat for about half an hour freely, when he is to be dried and rubbed well with coarse towels to get up a good cutaneous capillary circulation. This greatly relieves the congested and dilated capillaries of the lungs, and modifies, to some extent, the amount of inflammatory exudate, and at the same time reduces any existing high temperature. The chest is now encased in the cotton jacket, and should the patient complain of any pain over the seat of inflammation, a mustard plaster is placed over it, and after this is removed the chest is well oiled with camphorated oil, which is not only soothing but gives off an agreeable odor to the patient, and somewhat soothes and relieves the embarrassed respiration.

The bowels are now to be acted on by the administration of two or three grains of calomel given in divided doses of half a grain every half-hour, to be followed in six to eight hours by a Seidlitz powder or dose of Epsom salts. When this is accomplished we have succeeded in relieving very materially the engorged blood-vessels, and especially the portal and pulmonic congested circulations and any distention of the right heart, and the pulse, though frequent, will be soft and compressible, and the temperature lowered.

The action of the kidneys is best kept up by the free administration of pure water at the temperature of the room. It is a serious mistake to administer stimulating expectorants and diuretics. The least medicine given the pneumonic patient, the better are his chances of recovery. To give medicines to excite too great functional activity in the already inflamed lungs or kidneys is absolutely contraindicated. The stimulating expectorants absolutely have no place in lobar pneumonia. The kidneys being more or less involved in every case of pneumonia, dry cupping over the kidneys is all that is required. The teeth and mouth must be kept sweet and clean by the frequent and thorough cleansing of the same with an antiseptic solution.

To aid in the elimination of the toxemia, mild action of the bowels should be kept up, either by a daily dose of a mild saline aperient, or aided by an enema of warm sterile water. The action of the skin should be maintained by the daily sponge bath of tepid water and soap.

The diet should consist of plenty of pure water at the temperature of the room, and all food should be liquid—chiefly milk. If the stomach is weak, the milk should be peptonized and be given in small quantities, not over four to six ounces at stated intervals of every three hours. Overfeeding must be avoided, as this would embarrass both respiration and circulation. If only one lobe is involved, our patient may go on to recovery without any further treatment, but if a large surface be involved, or a double pneumonia exists, our skill will be taxed to the limit. The heart will be the first to need our most careful attention. Heart symptoms may develop at an early stage, and the attending physician should make frequent visits to be able to recognize its earliest appearance. The nurse should be instructed and be on the alert at all times, never leaving the bedside, that she may recognize any wavering of the heart action.

The treatment of pneumonia here is the treatment of the conditions presented,

not the treatment of the lungs, but the stimulation of the heart and the elimination of the toxemia. To help ward off heart weakness, the author usually commences the early administration of one-sixtieth grain of strychnine hypodermically every four to six hours, according to amount of lung surface involved and the condition of the circulation, and gradually and systematically increases the dose to one-thirtieth or one-twentieth grain, as circumstances demand. Strychnine acts powerfully upon the vasomotor and respiratory centers, increasing their activity, and we must not push the remedy too strongly, for strychnine is a stimulating expectorant, and we may, at certain stages of the disease, increase the engorged condition of the lungs. We therefore should watch its action as closely as we watch the action of the wavering heart. This is why we are sometimes disappointed in the action of strychnine when it fails to strengthen the heart's action at a critical time. It is here that alcohol in the form of good rye whiskey or pure brandy, in doses of one-half ounce, diluted in water, supported by five minims of tincture of digitalis, is called for, and the strychnine continued in moderate doses. Should we need a more quickly acting stimulant, 30 minims of the aromatic spirits of ammonia with five to ten minims of tincture of digitalis, given in water, is called for.

THE CLIMATE OF SOUTHERN CALIFORNIA WITH REFERENCE TO PULMONARY TUBERCULOSIS.

Writing upon Southern California as a health resort ABBOTT says in the *Colorado Medical Journal* for March, 1904, that it is not a "Perpetual Spring," as our railroads advertise it, but it is a great deal better. It is perpetual fall, an everlasting September and October of New England. We do not have the hot, muggy, humid climate of Florida, but the clear, cool air of a New England fall. The sunshine is hot, the air cool, not cold. Standing still in the sun one is too warm; step five feet into the shade and one is a little too cool; working and walking one feels just right. For this reason patients should bring their warm clothing. Our nights are always cool. A winter overcoat is often very comfortable when riding in the late afternoon or at night, just as it is in New England after a warm October day. In the East men go out without coats and work in their shirt-sleeves in September and October. Our men do this the year round.

Our "rainy season" is a misnomer; we have nothing like the rainy season of the tropics. The "rainy season," so-called, is merely the time when the rains come, now and then, here and there, from December to April. It rains in Southern California just as it snows in New England. Between the rains are the brightest, happiest days of all the year. We do not have rain enough, and from May to December we have hardly a rain-storm. Day after day, week after week, there is no rain at all, but the days are bright and clear the summer through.

Some tire of this perpetual sunshine, but not the tubercular patient. The relief to the kidneys and lungs by the comfortable activity of the skin is a great blessing to them. Those of us who live here enjoy the summer even more than winter.

Is the climate enervating? No, not in the least. It is somewhat more monotonous to those who have nothing to do, but the active man can do more here than in the East. And the tubercular patient must have something to do—bodily temperature permitting—if he would get well. He must "work out his salvation" physically, as well as spiritually. If he seeks a cure, he must plan for it as he would plan for a college education. One cannot secure a college education in two months or even a winter's course. Neither can one secure physical health in the same time. Let the tubercular patient plan for a two or four years' health course, and he will graduate a physically perfect man.

Many physicians and most patients think that climate is composed of clouds and sunshine, thermometers and barometers, wind currents—especially drafts—and rainfalls. One of the greatest factors of climate, as applied to the tubercular patient, is the geological structure of the few acres of ground upon which he lives. The underground climate is often of more importance than that above ground.

If the subsoil is a cold clay or hard-pan,

full of water, to within a few feet of the surface, the patient will forever be chilly, catarrhal, and rheumatic. If, however, it is a warm, well-drained, sandy and gravel subsoil, the patient will be warm limbed, non-catarrhal, and well nourished, if he will eat and exercise.

PESSARIES: THEIR USES AND LIMITATIONS.

In the *Medical Press* of July 6, 1904, GILES writes on this subject and gives the following advice regarding the indications for the use of pessaries. The author considers the conditions where pessaries are of service, and the particular kind to be used in each case. These conditions fall into three classes, which may, however, be more or less combined: (1) Hernia of the vaginal walls—that is, cystocele and rectocele. (2) Prolapse and procidentia of the uterus. (3) Backward displacements of the uterus.

1. *Hernia of the Vaginal Walls.*—In uncomplicated cases of cystocele and rectocele a rubber-ring pessary usually answers best, whether there be a cystocele alone, a rectocele alone, or a combination of the two. But in some cases of cystocele a ring does not answer, owing to the tendency of the anterior vaginal wall to slip down in front of the pessary, and it is then that the author has sometimes found an inverted Hodge, with a single curve, meet the case. When a rubber ring is used, it should be thick in section, as in the Meyer pattern; if a large, thin ring be introduced, the vaginal wall will come down through it. Solid wooden or vulcanite rings should be avoided, because during their introduction and removal they stretch the vaginal orifice unduly. Sometimes the perineum is so deficient that the vaginal orifice is the widest part of the passage; in such a case no ring will keep in position any more than a ball could be held up in a hollow cone whose apex was upward. We must then rely on some kind of vaginal stem-pessary, such as Napier's, held in position with perineal bands fastened to a band round the waist.

2. Cystocele and rectocele are frequently combined with prolapse and procidentia of the uterus; or the uterus may descend without the vaginal walls being affected, otherwise than secondarily. In any case the uterus displacement is the one which calls for treatment, and the vaginal condition will be treated incidentally, and at the same time.

For prolapse—that is, descent of the uterus within the vagina—a rubber ring usually answers best. But if the perineum be deficient we shall require a Napier pessary, or other vaginal stem-pessary. Sometimes the perineal bands are not well borne, as they may cause chafing and irritation; and we may then have to resort to that makeshift of therapeutic insolvency, a Zwancke pessary, or to that other refuge of the destitute, a Gariel air-pessary. The effect of the latter is to keep the vagina in such a chronic state of distention that the natural shrinkage of the vagina incidental to the climacteric, which is looked to as the means of bringing about an ultimate spontaneous cure, is thwarted indefinitely.

For procidentia—that is, descent of the uterus outside the vagina—we have to proceed somewhat as for prolapse, with this difference, that the vaginal orifice is so stretched by the descent of the uterus that no ring will keep in at first. But, unless the perineum has been much torn, if the patient be kept in bed for a week or so, and the uterus remains within the vagina, the orifice will usually contract again sufficiently to retain a rubber ring.

3. *Backward Displacement of the Uterus.*—This is the class of displacement most difficult to deal with. In uncomplicated cases, where the uterus is mobile and has not been long out of place, a cure may not infrequently be obtained by means of a well fitting Hodge pessary, or one of its modifications, such as an Albert Smith, a Thomas, or a Braxton Hicks. In the two latter forms the posterior bar, which rests in the posterior fornix, is thickened. There are various conditions, however, which make for failure. If the retroversion has existed long, the uterus may attain a condition of hyperplasia, and the heavy fundus then topples backward over the pessary. If one or both ovaries be prolapsed, the Hodge is liable to cause such painful pressure that its use has to be discontinued. If there be cicatricial contraction obliterating the posterior vaginal fornix, or forming bands across it, a Hodge is

unavailing. The writer recently had such a case in the hospital, where an anteroposterior band stretched across the fornix from the apex of the cervix, and the only possible way of correcting the displacement was by ventrofixation of the uterus, which was accordingly done. If the uterus be the subject of a congenital retroflexion, we may push the organ somewhat forward, but the retroflexion will remain and undo our work. For such a condition pregnancy is the best cure. Lastly, if the uterus be held down by adhesions to the floor of the pelvis, pessary treatment is out of the question. The author has no confidence in the plan (which has been proposed) of forcibly breaking down adhesions by manipulation; to tear a hole in the bowel by such maneuvers would not be a difficult matter.

It is bad practice to introduce a Hodge or other pessary without first correcting the displacement, in the hope, which is a vain one, that the constant pressure of the instrument will gradually overcome the resistance. By such a course we merely add risk to inefficiency.

HEART LESIONS AND TREATMENT.

ABRAM in the *Lancet* of August 6, 1904, discusses the therapy of cardiac lesions and divides his subject into three headings: (1) Compensation practically equal to the lesion; (2) compensation only equal to the lesion when the patient is at rest; and (3) compensation unequal to the lesion.

1. Should the patient in the first subdivision be informed of his trouble? This is believed to be a wise procedure, otherwise it is difficult to get the necessary mode of life carried on. In general terms, we must warn him against excess of all kinds, mental as well as physical. It is not necessary to forbid exercise in moderation; cycling is permissible as exercise, but not in competition. If cycling be indulged in care must be taken not to struggle against head winds or up-hill. Moderation in the use of alcohol and tobacco must be enjoined, abstinence even being advisable. General dietetic and hygienic measures should be borne in mind. Even in this stage in mitral stenosis there is the risk of hemoptysis or embolism. The treatment the author has found most useful in hemoptysis is a free saline purge, with a dose of opium. Are such lives insurable? Most offices would reject aortic cases, but would accept mitral cases with an addition to the premium. For his own part, the writer would not advise acceptance, but would make it a rule to give a full report on the lines he has sketched, and leave it to the office to decide. His reason for refusal is the impossibility of foreseeing accidents, such as infection.

If the patient is a female, what should be our advice, if asked, as regards marriage? The less common form, aortic trouble, is a bar to matrimony. Well compensated mitral regurgitation cases often pass through pregnancy without trouble; in stenosis cases, although the same favorable course is possible, yet at times grave symptoms arise, and notably attacks of tachycardia or acute edema of the lungs. If pregnancy occurs in a case of mitral stenosis the patient should be kept under observation, and the slightest sign of distress should be actively treated. Limited diet, free action of the bowels, with possibly bleeding in the more threatening cases, will sometimes ward off the necessity for terminating the pregnancy. But marriage is certainly inadvisable.

2. In the second subdivision we find cases in which palpitation, precordial pain, and dyspnea are manifest on exertion, and in a more advanced degree some passive congestion and its results in the kidney and liver. In aortic cases throbbing in the neck vessels, headache, and giddiness may be troublesome. Absolutely the best treatment is a week in bed with limitation of fluid and regulation of the diet and moderate purgation. A belladonna plaster often gives relief—whether it acts medicinally or physically matters little. In aortic cases, the author has found bromide and iron to give relief. General tonics, iron, strychnine, and the like, with perhaps small doses (from two to three minims) of tincture of digitalis where rest cannot be taken, will help to put the case into subdivision 1. It is of great importance to determine the nature of the valvular lesion. Is it associated with vascular and renal disease, or is it purely cardiac? The tension of the pulse and the state of the artery are valuable guides

to treatment; when the former is high and the latter shows signs of disease, a rigid milk diet coupled with diuretics acting on the kidneys, such as the xanthin derivatives and the use of some mineral water, will help to lower vascular tension by eliminating toxins.

3. The case of valvular disease, whether aortic or mitral, which reaches the hospital suffering from the signs and symptoms of failing heart needs little description. The "heart-chair" to maintain the trunk upright is often necessary. The writer does not dilate on the necessity for care in feeding, but simply says that limitation of fluid is often of great service. The bowels may be gently acted upon. Sleeplessness is often a troublesome symptom in mitral cases attended with marked mental depression. In aortic cases excitement and even maniacal attacks may be present; the writer mentions one case of violent mania in aortic regurgitation. The modern hypnotics—trional or sulphonal and paraldehyde—sometimes suffice, but opium is our sheet-anchor. In a case of heart disease in a young subject admitted to the infirmary when the author was a house physician, all efforts had apparently proved futile, but opium before food was ordered in the form of liquor opii sedativus, and liquor pepticus after food. The girl forthwith began to mend, and eventually was able to leave the hospital in very fair condition. Good service has been rendered by the old pill of squill, digitalis, and mercury when the engorgement of the stomach and liver has been marked, and blue pill is the well-spoken-of remedy of many sound practitioners.

Should we use digitalis in aortic cases? The answer to this is not quite simple. When we find thickened arteries and possibly some increase of tension in the radial pulse, placing the case in what Huchard and his pupils would call the cardiovascular class, there is no doubt that the best line of treatment is to limit fluid intake, open the bowels, and give renal diuretics. If direct cardiac stimulants are used, strophanthus is preferable. As common practice in these cases the author gives strophanthus through the day with a dose of agurin night and morning. Even in these cases, however, when the pulse tension is low, digitalis is demanded, and there should be no hesitation in giving it to an aortic case when the mitral valve has yielded. Trousseau's diuretic wine is a good remedy in similar cases. When digitalis cannot be taken by the mouth, the hypodermic use of digitalin will often start the case on the way to convalescence. Of course, in some cases edematous fluid will have to be removed by instrumental pressure; this especially applies to the accumulations in the serous cavities. Dyspnea is often improved by the use of atropine and strychnine hypodermically. The sinking sensation so often complained of by cardiac patients in the later stages can be alleviated by the exhibition of solid opium or neat brandy.

INEBRIETY AND ITS TREATMENT.

In the *Lancet* of August 6, 1904, JONES writes as follows on this subject:

The treatment resolves itself into the general treatment of drunkenness and that of the individual. As to the latter it is either in their own homes or in retreats. In both cases it is certain that alcohol should be cut off completely, and in the great majority of cases, indeed with but few exceptions, the total and sudden deprivation of alcohol is beneficial. In the few exceptions collapse results from sudden withdrawal of stimulants, and this needs careful watching, for in cases complicated with insanity pneumonia is not an uncommon complication. This pneumonia fails to undergo resolution, and it ends in phthisis, with death probably within the year. Sleep and nourishment form the key-note of treatment; sleep is best obtained by gentle outdoor exercise, failing this by bromides —but not by morphine, as the latter may initiate a new craving. The great motor restlessness so often seen in alcoholic cases, and caused by painful visual and aural hallucinations, is best controlled by hyoscine in doses of from 1/120 to 1/60 of a grain administered hypodermically. Sulphonal and trional (20 grains twice or three times a day) are also useful, but they increase the muscular incoördination, and as the solubility of these drugs is limited they may disturb digestion and give rise to gastroenteric catarrh. When the pulse is weak, and in the case of elderly persons, paraldehyde in drachm

doses is a safe sedative stimulant. It is necessary to watch for retention of urine when patients are under the influence of sedatives, and it is also important to notice twitching of the muscles, which may indicate uremia, although convulsions may be due to causes other than alcohol, such as diabetes, or epilepsy, or cerebral hemorrhage.

As to feeding, simple, easily assimilable food—peptonized if necessary and a little at a time—should be administered. The general disturbance of the digestive system, marked by loss of appetite, sickness, or vomiting, often tends to make the taking of food repulsive. In these circumstances ice, effervescing mixtures, salines, bismuth, or lime-water may be useful. The bowels should be carefully attended to, and saline aperients taken freely to correct the dyspepsia and improve the appetite, which can often be stimulated by nux vomica, pepsin, dilute acids, or strychnine and bitter tonics. When bedridden the greatest attention must be given to cleanliness and the prevention of bed-sores, for the tissues of alcoholic persons are peculiarly unresistive, and bed-sores once formed are most difficult to heal. For the cure of inebriety it is not believed that there is any drug that can be relied upon, and the secrecy of the various cures indicates their futility.

THE TREATMENT OF ACCIDENTAL HEMORRHAGE.

Sir Arthur Macan's valuable paper, read before the recent meeting of the British Medical Association, on the subject of accidental hemorrhage during pregnancy, and the discussion to which it led, may be said to point a moral and adorn a tale that will not perhaps be useless to the coming generations of English obstetricians. The tale is very similar to that related to the Obstetrical Society of London by Dr. Teacher, in his now classical paper on "Deciduoma Malignum," and its burden is that preconceived and settled ideas, when not supported by facts, hinder progress. The moral is, if we may express ourselves in the vulgar fashion, to beware of "cocksureness." Past students of the London medical schools will remember how a well known London writer on obstetrical subjects openly stated that he would "plough" any student who told him that in cases of accidental hemorrhage he would plug the vagina. Many of the same students went to Dublin to learn their midwifery in the Dublin maternity hospitals. They saw there the treatment which London had condemned adopted, with the result that the mortality of accidental hemorrhage, instead of being 40 to 60 per cent, as they had been taught, was something between 3 and 8 per cent, and they were confessedly puzzled. The question immediately occurred to them: Why should Professor So-and-So in London state that the mortality of accidental hemorrhage was 40 per cent, and that plugging would kill the patient, when in Dublin the mortality is inappreciable, and the vagina is always plugged?

This condition of affairs was the rule ten years and more ago, and yet it is but within the last year or two that the London obstetrical school has come to recognize that dogmatism and truth do not always go together. The London Obstetrical Society laid down that the tumor known as deciduoma malignum was nothing but a sarcoma of the uterus. As a result, the majority of English obstetricians and pathologists took no further interest in the growth. Everything was known about it; the Obstetrical Society had told them so. However, it was subsequently found that the Obstetrical Society had told them wrong. Similarly, with regard to the treatment of accidental hemorrhage, London opinion laid down three "laws:" that the student who suggested the plugging of the vagina would be "ploughed;" that the medical practitioner who used the plug would kill his patient; and that the plug would convert an external into an internal hemorrhage. The last two "laws" were proved to be wrong, but still the first remained, and as a result the spread of the knowledge of the treatment was delayed and many lives were sacrificed. At last a change came. The younger generations of obstetricians decided to think for themselves, and to cast off hereditary shackles by which they had been bound. The Obstetrical Section of the British Medical Association agreed to discuss the treatment of accidental hemorrhage. The chief active opponent of the treatment by plugging remained

away from the discussion; the chief passive opponent confessed that he had always thought well of the treatment, but out of regard for the examination prospects of his students he had refrained from mentioning it; and Sir Arthur Macan's paper was heartily accepted by the meeting.

It is to be hoped that as a result of the change of opinion the pendulum will not now swing too far in the opposite direction, and cases be treated by plugging for which such a treatment is unsuitable, and so discredit be brought on the method. Plugging the vagina is the best treatment that has as yet been suggested for cases of accidental hemorrhage in which the patient is not in labor, and in which the bleeding is external. It is a useless line of treatment in cases of severe concealed accidental hemorrhage, unless the uterine wall has commenced to react against a further increase in the uterine contents. It is an unnecessary line of treatment in cases in which the patient is in advanced labor and the uterine contractions are strong. As the present appears to be a favorable time for the upsetting of preconceived ideas, it is suggested that the supremacy of Marion Sims's position in gynecological examinations and operations should be attacked. It is believed that England is the only country which still adheres to this position, and the use of the more generally adopted dorsal position does not favor the occurrence of parametritis, as was recently stated by an English writer.—*Medical Press and Circular*, Aug. 17, 1904.

DISEASE OF THE THYROID, WITH AN ANALYSIS OF TWENTY-EIGHT CASES.

WEBSTER (*Brooklyn Medical Journal*, April, 1904) reports a series of thirteen cases of simple goitre treated surgically and three medically, and twelve cases of exophthalmic goitre, of which two were subjected to operation.

Of the cases of simple goitre there were four males and twelve females. The ages ran from nineteen to forty-nine years, both limits in women. With one exception all commenced under thirty and after twelve years, the average age being twenty-one. One patient died immediately after operation from hemorrhage and shock; one developed cachexia strumipriva, which later yielded to treatment; the rest recovered. Of postoperative complications, nausea and vomiting was produced in two, difficulty in swallowing in one, and hoarseness in two.

The three cases treated medically are chiefly interesting from the failure of the thyroid extract to benefit the tumor in one, while in the other two complete cures resulted. Both responded promptly to thyroid treatment, with occasional courses of KI, the treatment being continued for three months in each case. This bears out the statements of Baumann and others that as high as sixty per cent of cures may be expected in young subjects treated by the thyroid method.

Of the cases of exopthalmic goitre, there were two men and ten women. The ages ranged from fourteen to fifty-four. Previous illness was present in every case. Scarlet fever is specified three times, rheumatism twice, pulmonary disease twice, excessive masturbation once, spinal sclerosis once, severe fright once, repeated childbirth twice, chronic diarrhea once. Menstrual disturbances with tendency to diminished flow are noted in six of the twelve.

Of objective symptoms a goitre was present in 10; pulsation or a bruit in 10; tachycardia in 10, 4 of whom were subject to nocturnal seizures of palpitation; evident dyspnea in 10; muscular tremors in 7; exophthalmos in 9; Stellwag's sign in 5; von Graef's sign in 2; nystagmus in 1; lacrimation and photophobia in 1; localized or general edema in 3. A coated tongue is noted in 7 of the cases, dryness of the throat in 1, hoarseness in 2. Pigmentation of the skin is noted once and erythema once. Excessive perspiration occurred in 5 cases, the opposite in 1.

Nervous symptoms, including hysterical outbreaks, restlessness, sleeplessness, terrors, paresthesias, pruritus, irritability, unreaonable excitement, exaggerated reflexes, and so on are noted in every instance.

Urinary symptoms are recorded in eight of the twelve. Of these, a trace of albumin was noted six times, casts three times, abnormal changes in density twice, presence of blood elements three times, and indican once.

The average pulse-rate is high; the

lowest recorded is 80, the highest 156; for the rest, 110 is a fair average. Temperature, on the other hand, ranges low. Respirations are recorded as above the average.

Of cardiac changes, murmurs of various sorts are recorded in six, enlargement as indicated by displaced heart twice, in one the action is recorded as rapid and tumultuous, and in three no changes were detected.

Two patients were subjected to partial ablation with beneficial results. The others uniformly received rest in bed, limited diet, and cardiac stimulants, of which digitalis and belladonna seem to have been most favorably regarded, with KI and thyroid as second choice.

Two of these patients died, one was not improved, and nine were benefited.

INTERMITTENT HYDROPS OF THE JOINTS.

In 1901 Brackett and Cotton were able to collect forty-three undoubted cases of intermittent hydrops of the joints. MARSH (*Lancet*, June 4, 1904) reports two cases of this affection which have come under his observation. The local condition consists of an effusion into the cavity of the joint. This may be small in amount, but in some cases the cavity is tensely distended so that there is considerable pain. The fluid removed from the knee-joint in one of the writer's cases was sterile, and apparently was merely diluted synovia. In a few instances, while there has been little or no effusion into the joint, the synovial membrane has been swollen and the surrounding tissues have been edematous. No case of suppuration or formation of adhesions suggesting inflammatory changes has been recorded. The joint most frequently involved is the knee. Often both knees are affected and are the only joints attacked. But all the large joints and even the lower-jaw joint and the joints of the spine may be concerned. The condition may be limited for some years to one particular joint, or several joints may be attacked simultaneously or alternately, or many joints may be attacked in succession. The attacks reach their height in the majority of cases in two days, and then subside in two days, so that they extend in all over four days. Yet the attacks may be much shorter. The time of recurrence of the attacks varies widely in different cases. In one case the attacks recurred every evening. In some an attack takes place every third or fourth day; in some only once every month. In two cases there was an interval of three months. The period of recurrence most commonly observed is between the ninth and fifteenth day. In some cases the period changes. In one it changed from the thirtieth to the ninth day. In another from three months to eleven days. The affection is slightly more common in the female sex. As to age, although a doubtful case has been reported in a girl aged nine years, only three cases began as early as the fifteenth year. One patient was fifty-four years old. The affection most commonly begins about the twenty-sixth year. In a few instances the attacks have corresponded with the menstrual periods.

At present nothing definite is known as to the pathology of these cases. Treatment to a certain extent is symptomatic. Quinine and arsenic have cured a certain number of cases, and both have failed in other instances. The writer recommends giving quinine as the first step, and if it fails give arsenic, and continue it, if need be, over a period of weeks or months.

No local treatment has given any definite results. During the attacks the joints must be kept at rest as the patient is unable to use them, but rest seems to have no effect in preventing or materially modifying the attacks.

GRANULATING WOUNDS TREATED BY BORIC ACID AND RUBBER TISSUE DRESSINGS.

SCHLEY (*Medical Record*, June 4, 1904) secures the rapid epidermization of extensive, exuberant, or freely granulating surfaces by covering them abundantly with finely powered boric acid. This is covered smoothly with rubber tissue, overlapping the edges of the ulcer by an inch or two, and held in place by adhesive plaster strapping. Absorbent gauze covers the tissue, again overlapping its edges, and a snug supporting bandage completes the dressing.

The dressings are rarely changed oftener than once in five days, usually once a

week, and occasionally the interval is longer.

The dressing is not a dry one, the rubber tissue preventing evaporation. The total wound discharge with the boric acid is less. It causes more rapid epidermization than any other method except skin-grafting. It has not been employed upon ulcers with gangrenous or sloughing bases, or extensively upon larger indolent ulcers without or with scanty granulating surfaces. Upon some smaller ulcers of this class it has worked very well. For burned areas and varicose ulcers of the leg this dressing cannot be too highly recommended.

TETANUS TREATED BY INTRANEURAL INJECTIONS OF ANTITOXIN.

Tetanus toxin exerts its effect entirely upon the cells of the central nervous system, particularly those of the spinal cord. Apparently the toxin ordinarily can reach the spinal ganglia only through the motor nerves, and it enters these only through the terminal muscle-end apparatus. Even when the toxin is placed directly beneath the dura of the spinal cord, provided the integrity of the nervous tissue is not disturbed, its course to the cells in the cord is through the lymph and then the blood, and so to the periphery, and thence up the nerves before any of the usual results occur.

To traverse a nerve from its end to its origin in the cord takes several days, and the longer the nerve the more time required before the symptoms of poisoning appear. Injection of the toxin directly into the substance of the cord causes tetanus within a few hours. Furthermore the toxin seems incapable of traveling in any but the motor nerves, and in these only centripetally. The antitoxin pursues exactly the same course. This suggests injection of antitoxin into the nerves which the toxin must traverse to reach the cord itself. Experimentally this seems to succeed perfectly, and at the same time the failures in the use of antitoxin are made plain. When the microorganisms can be demonstrated within a short time after the receipt of the injury and the antitoxin can be given subcutaneously or intravenously before the appearance of any symptoms, success with this treatment has been reasonably certain. The antitoxin enters the nerves ahead of or with the toxin and prevents the intoxication.

After the development of symptoms, subcutaneous, intravenous, or intracerebral inoculations with antitoxin are manifestly useless.

For a patient already giving symptoms it seems reasonable to ROGERS (*Medical Record,* May 21, 1904), in the light of this knowledge, to expose the nerves of the part in which the primary infection lies as near the cord as possible, and to inject the antitoxin into the substance of each nerve. This will prevent the absorption of more toxin. Then the antitoxin should be injected into the spinal cord low down, or in several places, to "head off," so to speak, the toxin which must have entered the blood, and so be carried to all the other motor nerve-endings in the body. A single high injection in the cervical cord would be not only dangerous but useless, as the toxin apparently cannot diffuse in a centrifugal direction, and the antitoxin seems to follow the same law. As the experiments show that the most minute abrasion of nervous tissue is sufficient for the entrance of the toxin, the usual lumbar puncture offers a reasonably safe and certain method of obtaining the desired result. The point of a needle introduced dorsally in the third or fourth lumbar interspace should scratch one or more of the nerves in the cauda equina, and so afford the necessary means of ingress for the antitoxin. Meyer and Ransom report a case which seems to have recovered by following this method of treatment.

The writer reports a case of tetanus in a boy twelve years of age who developed symptoms fourteen days after the receipt of a shot wound in the palm of the hand. Two days later the lower end of the brachial plexus was exposed in the axilla, and the inner and outer heads of the median nerve and the trunks of the ulnar, musculospiral, musculocutaneous, and circumflex nerves identified without much difficulty. Into the center of each of these five to ten minims of antitoxin was injected. A needle was then introduced between the third and fourth lumbar vertebræ, the needle being partially withdrawn and reinserted two or three times

in an effort to scratch the cauda equina, and a dose of one hundred and thirty minims of antitoxin was injected subdurally. There was a very marked change for the better, but symptoms of tetanus persisted the following day, when five minims of antitoxin was injected into the median nerve, sixty minims into the loose cellular tissue around the nerves in the axilla, and one hundred and sixty minims into the subdural space by lumbar puncture. Nearly all the symptoms disappeared during the succeeding twenty-four hours. In addition to appropriate local treatment, the boy received by rectal injection four doses, each consisting of 15 grains of chloral hydrate and 30 grains of sodium bromide.

The writer describes this case as one of the "delayed acute" type, which in his experience are almost if not wholly as fatal as the ordinary acute forms of the infection. The patient left the hospital perfectly well at the end of twenty days. Absolutely no ill results were noted as a result of injecting the antitoxin into the nerve trunks.

POSTPARTUM HEMORRHAGE.

In treating postpartum hemorrhage FRITSCH (quoted in *Canadian Practitioner and Review,* June, 1904) does not waste any time in trying useless methods. Prophylaxis consists in proper management of the third stage of labor. If the uterus is squeezed or massaged directly after the child is born the placenta partially separates, the uterus is unable to contract evenly, and hemorrhage is inevitable. When after-pains occur, the fundus may be gently rubbed for ten or twenty minutes after delivery. It is remarkable that in no reported case in which the uterus has not been touched, as in concealment of birth, has the mother died of postpartum hemorrhage. But if from any cause there has been hemorrhage, the uterus becomes atonic. Probably hemorrhage is more often the cause of atony than the result.

In cases of atony in which the woman is perhaps already pulseless the following procedure is safe and certain: The accumulation of blood in the uterine cavity is expressed, and the hands are passed between the recti, which are pushed aside easily so as to reach the back of the uterus, which is raised as high as possible, forcibly anteflexed, and compressed against the superior and posterior surfaces of the pubes. The internal os then lies exactly above the pubic portion of the iliopectineal line. The abdominal walls immediately after delivery are easily forced behind the uterus as deeply as the pelvic brim. The resulting funnel-shaped pouch of skin and muscle is firmly plugged with folded towels, linen, or large pads of cotton-wool, until the uterus is immovably fixed against the anterior abdominal wall and the pubes. A roller bandage is applied over the padding, forcing it behind the uterus toward the pelvic inlet. The body of the uterus then lies above and in front of the symphysis pubis. The method has the following advantages:

1. By compression of the abdominal cavity blood is retained in the upper half of the body even more effectually than by direct compression of the abdominal aorta and bandaging the legs.

2. Hemorrhage is impossible, as the uterine walls are so pressed together that the uterine cavity is obliterated.

3. Hemostasis is immediate. If the uterine cavity is plugged large quantities of blood escape during the operation and are absorbed by the tampon itself.

4. No time is lost in disinfecting the hands, as no internal manipulations are required.

5. The pad once in place, no further disturbance of the patient is necessary, and there are no uterine plugs to be removed.

ROUTINE APPENDECTOMY AS A COINCIDENT PART OF OTHER ABDOMINAL OPERATIONS.

CLARK (*American Journal of Obstetrics,* May, 1904) has removed the vermiform appendix in one hundred and twenty celiotomy cases in which some other disease formed the primary basis for operation. In 25 of these cases the appendix was normal; in 39 there was periappendicitis; in 18 (15 mild, 3 chronic), catarrhal appendicitis; in 13, chronic appendicitis; in 7, acute appendicitis; in 2, hyperplasia of lymphoid elements in appendix; in 5, fecal concretions in appendix; in 1, intestinal appendicitis; in 1, primary carcinoma of

appendix; in 1, atrophy of mucosa; and in 1, constriction due to previous catarrhal disease.

In this series of one hundred and twenty cases only one patient died, and this death came from causes in no way attributable to the operation upon the appendix. With intelligent patients, the question of whether or not the appendix is to be removed should be left to their decision. In the less intelligent class, where the surgeon's judgment must be the guide, the best interests of the patient will be subserved by the removal of the appendix.

When operating through a median incision, either one of two plans may be instituted for quickly locating the appendix. The acute angle of the ileum at its junction with the cæcum is usually the best guide when the attempt to locate the appendix by touch is made. With the finger hooked beneath the cæcum it is swept around this organ to the ileum, which is lightly grasped, thus drawing the cæcum up into the wound, which at once brings to view the anterior longitudinal band, and this unerringly guides to the appendix. When the cæcum is anchored by adhesions this maneuver may not be successful, and then the abdominal incision is lightly lifted upward with the retractor, when the cæcum may be located by sight, and with blunt forceps gently drawn forward into the wound.

SUPRAPUBIC PROSTATECTOMY UNDER NITROUS OXIDE ANESTHESIA.

The chief contraindications to the performance of prostatectomy until recently have been the dangers resulting from, first, the general anesthetic; secondly, hemorrhage; thirdly, shock. By the use of laughing-gas the great objection of a general anesthetic is at once removed. If, in addition, rapid work is done, then all three of the objections are removed. A prostatectomy done under nitrous oxide in from eight to fifteen minutes is not accompanied by any dangers from the anesthetic; the hemorrhage is very moderate and there is no shock. The patients are conscious even before the dressings have been applied. There is no vomiting, the pulse remains normal, and in a few minutes fluids are taken by mouth.

The patient is allowed to hold his urine for about twelve hours, and comes to operation with a distended bladder. With the patient in a moderate Trendelenburg position, a small incision is made above the symphysis pubis in the median line. The incision is deepened either between the two recti muscles or through the fibers of one rectus. Two silk guide sutures are introduced into the wall of the bladder, and the viscus opened by a small incision in the median line. The interior of the bladder is rapidly explored by the finger, the size and relations of the prostate ascertained, and any calculi that may be present removed. With a long, curved scissors, slipped along the index-finger of the left hand as a guide, the mucous membrane over the prostate is incised. The incision is made over the most prominent portion of the prostate, not more than half an inch long—just large enough to admit the tip of the index-finger. The incision may be anterior, posterior, or lateral to the urethral opening. If the prostate is deeply seated, it is pulled upward into the bladder by means of a special vulsellum forceps. If necessary, an assistant can press upward on the perineum and in that way push the prostate further into the bladder, but usually this is not necessary. Up to this point there is little or no bleeding. The more rapidly the operation is now concluded, the less hemorrhage there will be. The entire prostate is shelled out of its capsule by the use of the index and middle fingers, first of one hand and then of the other. The writer has been accustomed to freeing the gland on the right side and posteriorly with the right hand. Then, by turning his back to the field of operation and introducing the left hand, the left side and anterior portions of the gland are freed. The *sine qua non* of this step of the operation is to work between the capsule of the gland and the gland proper; there is then no danger of wounding neighboring structures. As soon as the gland has been removed, a rapid examination is made with the finger to ascertain if any portion of the gland has been left behind. Without any irrigation of the bladder, a strip of plain sterile gauze is packed firmly against the raw surface left by the removal of the prostate. Continuous bladder drainage immediately after the operation. The packing that was introduced into the blad-

der at the time of operation is removed at the end of twenty-four hours, and thereafter no packings are employed. During the first two or three weeks the bladder should be irrigated twice daily. A urinary antiseptic should be administered continuously, and the urine always should be kept acid. The patient is allowed to sit up out of bed on the fourth or fifth day after operation, and a few days later is allowed to walk about his room. The healing of the suprapubic wound is hastened by keeping it well strapped with zinc oxide plaster. As the wound contracts a smaller tube is introduced into the bladder. As soon as no more shreds of necrotic tissue appear in the urine, the tube can be left out, and the wound may be allowed to close. Two and a half to three weeks may be considered the usual time. A sound ought to be passed three weeks after the operation, and thereafter regularly once a week for three or four weeks longer.

The writer has operated on six cases. The youngest of his patients was fifty-seven years old, and the oldest eighty-two years. The average was sixty-nine years. Four of the cases had complete retention, which, in one case, had persisted for five years. In only one case was the amount of residual urine small. All of the patients had been under medical treatment for a considerable time before operation. The only case in this series that did not get a perfect result was one in which this sounding was omitted, and a stricture of the prostatic urethra resulted. This can and should be avoided in every case by passing a sound once a week after the third week.

POSTERIOR PERFORATIONS OF THE DUODENUM—TREATMENT.

Jeannel has recently collected 35 cases of injury to the duodenum. He calls attention to the comparative frequency of complete tearing off of the duodenum; there were 5 cases—3 close to the pylorus, and 2 at the juncture of the duodenum and the jejunum. This is explained by the fact that at these two points a freely movable part of the bowel joins a fixed portion. The incomplete ruptures are found at the lower half of the duodenum. Among twenty cases of incomplete rupture, the superior part was involved in 2 cases; at the level of the papilla of Vater in 4; below this, but still in the descending part, in 3; and in the inferior portion in 7. The site of the lesion was found 14 times through the anterior peritoneal-covered surface, and only 6 times through the posterior wall. In all of these cases except one, the direction of the rupture was at right angles with the long axis of the bowel. The length of the tears varied from the very smallest to those involving two-thirds of the circumference.

In looking up the subject of gunshot wounds of the duodenum, SUMMERS *(Annals of Surgery,* May, 1904) found only one case: this wound involved the first part of the duodenum and was operated upon successfully.

By cutting perpendicularly through the peritoneum about 3 centimetres to the right of the descending portion of the duodenum and insinuating the finger behind and toward the left, the descending portion of the duodenum and its lower flexure can be lifted out of the bed of loose cellular tissue formed by the fusion of the right mesoduodenum and the primitive parietal peritoneum. This movement exposes the posterior surface of the duodenum and admits of its repair. Kocher says: "The relations of the blood-vessels determine the limit of the rotation and the lifting forward of the bowel. The concave left-sided commencement of the duodenum is supplied with blood by the gastro-epiploica dextra, the chief branch of the gastroduodenalis. Important branches also go to the transverse colon over the inferior portion of the duodenum. These vessels lie under the upper layer of the gastrocolic ligament, and offer in themselves little hindrance to the lifting up of the inferior part of the duodenum from the spinal column.

"If the colon is raised there is exposed the colica dextra, the large branch of the superior mesenteric. The artery runs horizontally from left to right, and the branches pass down the duodenum to the lower and lateral circumference and to the right flexure of the colon. These vessels are not so easily lifted toward the left as those of the gastro-epiploica dextra, but they do not prohibit the freeing of the inferior flexure of the duodenum so that the whole vertical portion or limb may be loosened and brought forward. The rota-

tion is made with the hepaticoduodenal ligament above as a fixed point and a continuation downward of the left border of the duodenum over the head of the pancreas as an axis. The lower fixed point is determined by the location of the branches of the colica dextra, which limit the rotation and lifting up of the inferior flexure and a portion of the lower duodenum."

In case of the perforation of the posterior wall of the duodenum, in addition to repairing the duodenal wound or wounds, the pylorus should be occluded by means of a purse-string suture. Either at this same operation or as soon thereafter as reaction occurs, a gastroenterostomy must be made. None of these procedures require much time nor handling of the intra-abdominal contents; they are the only rational methods of treating a perforation of the posterior wall of the duodenum. It is almost impossible for a gunshot wound of either the stomach or duodenum, which perforates both walls, to be limited to those organs; therefore, in addition to the repair of any intraperitoneal organs involved, proper incisions must be made to provide for retroperitoneal drainage.

SIALOLITHIASIS.

Sialolithiasis is relatively infrequent. In 1896 Fütterer was able to collect 160 cases, and ROBERG (*Annals of Surgery*, May, 1904) has collected 47 cases occurring since that time.

Calculi occur most often between the ages of twenty and forty years. Burdel reports a case of calculus in the sublingual duct of a child aged three weeks. There had been difficulty in nursing, and it is reasonable to conclude that it had existed at the time of birth. Men are more often affected than women. Czygan gives the proportion of two to one. Another writer gives five to one.

Calculi vary in size from that of a grain of sand to 1⅛ inches in length and 2 inches in circumference, but the usual size is from that of a split pea to that of a date-stone or hazelnut. Though usually single, in 47 cases collected by the writer there was more than one in 7 cases. A large number of small concretions may be discharged from the duct, as in Spencer's case, in which the submaxillary gland also was filled with miliary calculi. Recurrence takes place in a small percentage of cases. Of the 47 there were 5 with recurrence. One had 3 in 22 years; one, 2; and two, 1 recurrence.

In shape the calculi are usually spherical or oval. In the ducts they often become elongated and resemble date-stones, and when multiple they are arranged end to end, the opposed surfaces being faceted. The surface is finely or coarsely granular and the color is a dirty yellowish-gray. Usually the structure and composition are homogeneous, though there are numerous exceptions. They are made up mostly of calcium phosphate and calcium carbonate. Foreign bodies have been found as a nucleus in only a small percentage of cases, and are found in the ducts more frequently without the production of calculi.

Galippe has made cultures from the interior of the calculi and has found bacteria in all cases. Hartmann also has found bacteria in smears and cultures.

The symptoms of salivary calculus are determined by the size of the calculus, its location, and the occurrence of suppuration. In the absence of the latter a calculus may exist for years without much disturbance. There are cases on record in which they have existed for 14, 28, and even 40 years. Usually the earliest symptom of calculus in Wharton's duct is "salivary colic," characterized by intermittent retention of saliva and accompanied by more or less pain and discomfort. Salivary retention, with the formation of a swelling in the floor of the mouth and in the submaxillary region, usually comes on when the patient is eating, remains for one or several hours, and disappears gradually; or it may be made to disappear by pressing upon it, thus expressing the retained saliva into the mouth. This swelling may come and go for years, until suppuration occurs, when the swelling becomes more or less permanent. The retention is not determined entirely by the size of the calculus.

The patient may be aware of the presence of a hard nodule in the mouth. There is usually some difficulty in chewing, swallowing, and speaking; at times

chewing and swallowing may be almost impossible, and it may be difficult to open the mouth. The swelling in the floor of the mouth may reach to the cutting edge of the teeth. Freudenthal reports a case in which the abscess became so large that death resulted from asphyxiation. The abscess frequently bursts in the mouth, often discharging the calculus. If only one calculus has been present, a cure results. Sometimes the stone causes a pressure necrosis of the overlying tissues, escaping through the opening thus made. In rare cases the calculus may be discharged through the normal orifice of the duct. With suppuration in the duct there is usually infection, and painful enlargement of the submaxillary gland.

When the calculus occurs in the submaxillary gland, the gland enlarges and becomes firm in consistency and tender to palpation, increasing slowly in size. There are periods when the gland swells acutely and becomes very painful, to subside again to its former condition. Eventually a suppurative cellulitis of the neck may supervene, and a diffuse phlegmon involving the greater part of the side of the neck and face may develop, resembling a case of Ludwig's angina. Even this may subside, to return at a later date. If not opened it may burst spontaneously. In some cases a fistula results, discharging pus and concretions.

In twenty-seven cases of fistula of Stenson's duct discharging saliva, as given by Duplay and Reclus, three were caused by calculi. Roberg has not found a salivary fistula of the other ducts or glands caused by calculi.

The constitutional effects of salivary calculi are usually slight.

The calculus can often be detected by sounding the duct; and Gerota reports a case of calculus in the submaxillary gland which was detected by the *x*-ray.

The indications for treatment are to evacuate the abscess, remove the calculus, and in some cases to extirpate the gland. When a stone is located in the duct it should be removed through the mouth, though this may be impossible when the stone is situated in Stenson's duct. Solé removed six calculi from Stenson's duct from the outside, suturing the duct, and obtaining healing by primary intention. If a gland has been the seat of infection secondary to a calculus in the duct, even for a long time, the enlarged gland becomes normal in size in from one to two weeks after the removal of the calculus.

If the submaxillary or the sublingual gland is thought to be the seat of a calculus, it must be reached from the outside. After exposure of the gland it is incised. If a single calculus is found and the gland not much changed, the calculus can be removed and the gland left. If the calculi are multiple and difficult to remove, or the gland is the seat of miliary abscesses, it is well to extirpate it.

In case of calculus of the parotid gland, incision, removal of the calculus, and drainage are all that can be done.

IODIZED CATGUT.

BINNEY (*Boston Medical and Surgical Journal,* May 12, 1904) finds that catgut prepared by Claudius's method is superior to other catgut because (1) it is invariably sterile; (2) it is absorbed readily by the tissues; (3) the ease and simplicity of its preparation enable the surgeon to prepare his own sutures with minimum trouble; (4) it is comparatively cheap.

This method consists of placing raw catgut wound on glass spools directly into a solution of iodine 1 part, potassium iodide 1 part, water 100 parts. This is made by dissolving the potassium iodide in a small amount of water, to which the pulverized iodine is added, then diluting with water to the above strength. Through the action of the iodine solution the gut becomes black in color, completely sterile, antiseptic, pliable, and easy to tie. The bottle is labeled and dated, and after eight days the gut is ready for use and may be kept in the same solution and bottle. Careful experiments have shown that after eight days the gut invariably becomes sterile. Immediately before using, Claudius recommends rinsing the gut in a three-per-cent aqueous solution of carbolic acid (or any sterile fluid) to remove the surplus of iodine solution. Better results, however, are obtained by rinsing the iodized catgut in 95-per-cent alcohol, to remove the superfluous water, then storing the gut in a solution of biniodide of mercury 1 part, 95-per-cent al-

cohol 1000 parts, glycerin 20 parts. Gut preserved in this solution retains the iodine well, and is stronger than that preserved in watery solutions. The fluid, being antiseptic, permits the return to the bottle without resterilization of any unsoiled catgut not used during the operation. Soiled gut may be used safely after resterilizing in the iodine solution.

The longer the gut has been kept in the solution of mercuric biniodide, the stronger it appears to become, and for this reason the gut which has been but recently sterilized may be found of insufficient strength. If, however, the spools are allowed to stand in the air before using for fifteen minutes or more, the gut becomes very strong, and of a convenient consistency for tying. The suture material should be removed from the solution at the beginning of the operation. Then it should be unwound from the spools and cut into convenient lengths, laid on the instrument table, and covered with a sterile towel. The above procedure gives most satisfactory results.

The preserving solution of biniodide of mercury is stable and has no unfavorable action on the catgut, which may therefore be used safely after keeping a long time. In several cases gut which had stood for two months was used and found thoroughly satisfactory.

SKIN-GRAFTING OF INFECTED AREAS.

To render the septic area aseptic is the whole secret of success in preparing an infected raw surface for the immediate application of Thiersch's grafts, and lessening the time required for effecting a cure.

WILCOX (*Annals of Surgery,* May, 1904) recommends that the night before the operation the ulcerating and surrounding area should be cleansed as thoroughly as possible with green soap and hydrogen peroxide to remove the dried crusts and débris from the granulations. In case of very foul varicose ulcers more time may be taken, and a compress wet with 50-per-cent solution of peroxide may be applied for a few days until the exudate is removed.

After cleansing, the raw surface is covered with a compress saturated with a one-per-cent solution of formaldehyde (the ordinary 40-per-cent pharmaceutical preparation being the unit), and this compress is allowed to remain in place until the patient is on the operating table. When the compress is removed it will be found that the granulation layer is dark-red in color, having an appearance much like smoked beef. This layer is about a quarter of an inch in depth, is friable, and can be scraped off easily with a sharp spoon from the underlying tissue, which is whitish and bleeds very little. The removal of the granulation layer should be thorough, and any oozing can be stopped by the application of an Esmarch rubber bandage for a few minutes. The use of the rubber is a valuable aid in the operation as it makes equable compression and does not stick to the tissues when removed, but leaves an ideal surface for skin-grafting.

The remainder of the operation is the ordinary one for the application of Thiersch's grafts, the after-treatment being the same. As a rule, at the first dressing, three or four days after the operation, the grafts are found adherent and in good order. The dressings should be done every two or three days until the healing process is complete.

Large granulating surfaces resulting from burns by molten metal, the cutaneous defect after excision of the breast, and a varicose ulcer the size of an adult hand, have been completely healed in a little over two weeks, with perfect success.

INJURIES TO THE AXILLARY VESSELS DURING OPERATIONS FOR CARCINOMA OF THE BREAST.

SMITH (*Annals of Surgery,* May, 1904) communicated with various American surgeons relative to their experience with injuries of the axillary vessels inflicted during operation for carcinoma of the breast. He received replies from 71, 44 of whom had never injured the axillary vessels, and 27 of whom reported one or more cases.

Sixty-three cases of injury to the vein are reported. In no case did permanently bad results follow injury to the vein, whether the vein was partially or wholly occluded with the ligature or forceps. In some cases an edema of the arm is re-

ported; this is usually of slight degree and transient. Air embolism did not occur, nor did any septic trouble arise from the resulting thrombosis of the vein.

The cause of injury seems commonly to have been due to more or less extensive adhesions between cancerous lymphatic glands and the wall of the vein, making an injury to the vein an easy or unavoidable consequence. Where such a condition is found, Gerster states that he never dissects away such glands, but prefers to excise the adherent portion of the vein after double ligation. This plan was carried out by several others. A considerable number of cases occurred during a second operation for recurrence. Actual occlusion of the vein was often deliberate and made necessary by the extent of the disease. Slight injuries occurred accidentally; pricking of the vein wall with a needle was reported frequently; and tearing of the vein wall was common. Tearing away one of the branches of the vein was also a common occurrence.

In order to prevent injury to the vein, a very free exposure is commonly advised and practiced. Great care in manipulation while removing the axillary contents, especially where glands are extensively involved and adherent, is imperative.

Where the injury was slight an attempt was always made to apply some form of lateral ligature or forceps. The vein was either picked up with a forceps and a lateral ligature applied on a needle or otherwise, or a running suture was made. Marcy lays considerable stress on the use of fine kangaroo tendon, leaving the inner surface of the vein smooth. He has applied this method to the common iliac and twice to the femoral, and has always had good results, the circulation being undisturbed. By others both catgut and silk have been employed, apparently with equally good results. A forceps left on for forty-eight hours was used by Deaver, Henrotin, Stone, and Park. When actual occlusion was necessary, a ligature was simply thrown around the vein above and below and tied; the intervening portion sometimes was cut away with the diseased tissue.

Injuries to the artery are much rarer than those to the vein. This undoubtedly is due to the less exposed position of this vessel, the strength of its walls, and its easy detection while working near it. As with the vein, the injury may be so slight as to suggest closing the defect without occluding the lumen, or it may be such as to demand ligation of the artery. In none of three cases occurring during the operation for cancer of the breast, nor in two cases undertaken for other purposes, was there serious disturbance of the circulation.

As to injuries of the artery, the material is too meager to allow of definite conclusions. There was no permanent bad result in the five cases reported. Artificial heat during reëstablishment of circulation seemed necessary in the cases where the artery was occluded.

CALCULUS IN THE URETER—CONCLUSIONS BASED ON A STUDY OF ONE HUNDRED AND THIRTY-FOUR CASES.

Three new cases of calculus in the ureter are reported by TENNEY (*Boston Medical and Surgical Journal,* Feb. 4, 1904), making a total of one hundred and thirty-four recorded. From his study of these cases and their histories, Tenney arrives at some interesting conclusions.

Intermittent pain on one side, with varying amounts of red blood in the urine, are constant symptoms of stone in the ureter. Though the best means of locating stones, the *x*-ray cannot yet give evidence sufficient in itself to warrant operating or refusal of operation on certain cases. If a calculus starts from kidney to bladder, it is likely to catch within an inch of one of three places, all of which are accessible to the surgeon through extraperitoneal openings. The first point of narrowing is about 7 centimeters down, the second just above or below the brim of the pelvis, and the third as the ureter enters the bladder wall. A single calculus is the rule, but the exception occurs, according to these cases, about once in eight times. The opening in the ureter or kidney pelvis for removal of the calculus should be sutured if possible. Both sorts of suture materials have been used with equally good results, and wounds in both locations apparently heal equally well. The recovery is only delayed if sutures

are not used. A calculus in the ureter is a menace not only to health but to life, and its removal is an operation of low mortality, provided it is undertaken before secondary changes appear in the kidneys.

As to the choice of operation, there are several things to consider. The transperitoneal route gives access to all parts of the ureter; it does not give opportunity for complete examination of the kidney or renal pelvis, and it does open the abdominal cavity to an extra source of infection. It has been but little used, and is partially responsible for one death. Only one writer argues in favor of this route, but neither his argument nor his figures are convincing.

On the other hand, the kidney and the whole extent of the ureter, including that portion which is in contact with the bladder, are quite as accessible extra-peritoneally as through the abdominal route.

According to the figures of the 134 cases, the operator may expect to find the stone within an inch of one of three definite points, but he should not only make sure of the removal of one stone, but demonstrate the absence of others which might cause trouble later.

If a patient is sick enough to call for operation, and especially if operation is decided upon during the earlier attacks of colic, the kidney and its pelvis should be thoroughly explored, and the same incision which exposes them makes the first point of narrowing in the ureter accessible. If nothing abnormal be found, through this incision, a full-sized ureteral bougie should be passed into the bladder. If obstruction be found, or if it seems desirable to follow the ureter down with the fingers, the incision may be extended, as advocated by Israel, Morris, and others, forward and downward to the outer border of the rectus muscle two inches above the pubes, and this incision may be carried straight through all the muscular layers down to the peritoneal fat in which the ureter lies. This cut is from twelve to twenty inches long, and crosses the upper half of the external oblique and upper two-thirds of the internal oblique and transversalis at right angles to their fibers. It must weaken the wall, and in one case at least has resulted in a hernia.

The other method is to make a new incision entirely separate from the one which exposes the kidney. This incision should correspond to the lower end of the long cut before described, and the center of the incision should come over the point where the ureter crosses the iliac artery.

After going through the skin the muscular layers can be separated by dissection between their fibers, and the ureter can be identified by gently twitching it from above. Once found, it is easily separated from the peritoneum, and the fingers passed through the upper incision can meet the fingers passed in through the lower. The ureter can now be traced along the wall of the pelvis and down to the point where it enters the bladder wall.

Some advise pushing the stone down into the bladder, but the small size of this constriction as compared with the upper isthmuses makes this suggestion difficult if not dangerous to carry out unless the orifice be already dilated. There is so little danger in taking the calculus through the ureteral wall that it seems wiser to remove it directly, with as little manipulation as possible, provided it cannot be easily pushed up to the most accessible point.

Extra-peritoneal ureterotomy has been done thirty-four times, with five deaths. Three of the five were suffering from anuria when operated; one showed cystic kidneys at autopsy; and the fifth had a dilated and fatty heart.

RENAL REDECAPSULATION.

One invariable effect of renal decapsulation as observed in numerous experiments upon animals, as well as in the few reported autopsies after operation in man, is the formation of a new capsule proper, replacing the one removed at operation. The new capsule becomes fully organized in from three weeks to three months after operation; it may be thinner or thicker, but it is always more succulent and vascular than the original capsule.

EDEBOHLS (*Medical Record,* May 21, 1904) recently had occasion to decapsulate a second time the kidneys of a patient upon whom he had performed renal decapsulation two years previously. This is the first and so far the only instance in which renal redecapsulation has been performed. The patient was a man

aged twenty-six years, who had had albumin and casts in the urine for five years. He suffered from migraine and had slight edema of the feet, but otherwise was in fairly good health.

Decapsulation of both kidneys was performed May 1, 1902. The operative diagnosis was chronic interstitial nephritis with infection. For six months following operation the general condition was good. Thereafter the patient passed through several attacks of acute suppurative pyelitis. Finally on March 30, 1904, uremic convulsions supervened, followed by continuous coma and great swelling and discoloration of the face. Complete suppression of urine occurred. On the following day the patient was in a moribund condition, continuously unconscious, and frequently in convulsions, not a drop of urine having been secreted for thirty hours.

Less radical therapeutic measures having failed, redecapsulation of both kidneys was performed. The fatty capsules completely covered the kidneys, being adherent posteriorly to the scars of the former operation and anteriorly to the kidneys. The kidneys were found covered by a newly formed capsule proper, which was somewhat thinner and perhaps more transparent than the original capsule. It was peeled off from the entire kidney, and cut away as easily as at the first operation.

The uremia remained uninfluenced, and five hours after operation the patient died in uremic coma. The flow of urine, however, was started by the operation, although too late to be of any avail in saving life. During the last three hours of life the patient voided considerable quantities of urine.

Three points are particularly noteworthy in this case: (1) The nullification of the usual good effects of renal decapsulation by persistent chronic infection of the genito-urinary tract. (2) The immediate and normal fixation of both kidneys as a result simply of dropping the kidneys back into their fatty beds after decapsulation. (3) The prompt effect of decapsulation in relieving complete anuria.

Judging from the above solitary experience in the living, and from an additional observation in the dead-house, the removal of the new capsule presents no greater technical difficulties than the removal of the original renal capsule.

MUSCULOSPIRAL PARALYSIS TREATED BY TENDON TRANSPLANTATION.

In a boy, sixteen years of age, who had a complete paralysis of the musculospiral nerve, GRAY (*Lancet,* May 21, 1904) exposed the tendon of the flexor carpi ulnaris by a longitudinal incision over it, cut it across just above the pisiform bone, and detached a few of the lowest fibers of the muscular attachment to the ulna. He then made an oblique incision over the back of the forearm, reaching downward as far as the level of the wrist-joint, and separated out the common extensor tendons. A tunnel close to the ulna was made through the interosseous membrane, just above the upper border of the pronator quadratus, a forceps was passed through this from back to front, and the tendon of the flexor carpi ulnaris was pulled through. Hyperextension of the fingers and wrist was made, the extensor tendons were cut across just above the level of the wrist-joint, and the distal parts were sutured to the end of the flexor carpi ulnaris tendon. The wounds were closed, and the elbow-joint, forearm, and hand were enveloped in plaster of Paris, the wrist and fingers being fixed in the hyperextended position with the elbow flexed.

At the end of three weeks after the operation, when the dressings were removed, the wounds were healed, and it was found that after having his fingers flexed the boy was able to extend them immediately to the full extent. Supination is performed easily and strongly. When at rest the thumb lies flexed in the palm.

The writer now proposes to transplant the tendon of the flexor carpi radialis through the interosseous space close to the radius and then attach to it the several tendons of the extensors of the thumb at different levels, so that extension of the proximal phalanx will be obtained slightly in advance of extension of the distal one. The latter procedure will increase still further the power of supination. By the above operation two comparatively useless muscles are made to fulfil very useful functions, and approximately normal movements will be the final result. Both transplantations may be made at the same sitting. Such an operation is superfluous where successful nerve suture can be done.

ORAL SURGERY—PREVENTION OF THE ASPIRATION OF BLOOD.

During operations in the mouth and nose under general anesthesia, HERZOG (*New York Medical Journal and Philadelphia Medical Journal,* May 28, 1904) guards against the aspiration of blood in a simple but effectual manner.

He intubates the patient and connects the intubation tube by means of a tightly fitting end-piece with a rubber tube, which is passed through the patient's nose. The inspired air or anesthetic is taken into the lungs through the rubber tube.

The necessary armamentarium consists of an intubation set, a laryngeal forceps, the "end-piece" consisting of a piece of tapering oval tubing which fits tightly but easily into the intubation tube, and a small plug, which may be used for the purpose of closing the end-piece.

The method of procedure is as follows: After intubating the patient, insert the plug into the end-piece, so as to occlude it and prevent it from becoming clogged with nasal mucus. Pass the rubber tubing, to which the end-piece is firmly wired, end-piece first, through the nose, and when it shows behind the soft palate take hold of it by means of a forceps and extract the plug. Then take hold of the end-piece by means of a laryngeal forceps and insert firmly into the opening of the intubation cannula. Thus the larynx is occluded as safely as can be desired. The patient will breathe through the rubber tube, and the anesthetic can be administered in this way as easily as through the tracheotomy tube.

FACIAL TIC AND FACIAL SPASM.

French writers draw a sharp line of distinction based on clinical symptoms and prognosis, as well as on pathogenesis, between the two kinds of convulsive movements to which the terms "tic" and "spasm" are applied. Meige insists that the diagnosis of facial "spasm" can be made on purely objective clinical grounds.

MACKINTOSH (*Scottish Medical and Surgical Journal,* April, 1904) defines these terms as folows:

A *spasm* is the result of irritation at some point in a spinal or bulbospinal reflex arc—*i.e.,* there is always some material cause of irritation, lying in the afferent tract or the center or the efferent tract.

A *tic* does not require any material cause of irritation in the reflex arc; it may have originally started as a motor response to a peripheral sensory irritation, but the cause may have been cortical stimulation, an "idea," from the first. By repetition, the convulsive movement soon becomes a habit, which continues, though the cause may disappear. This can happen only when the inhibitory power of the will is enfeebled, for the mental state of a person subject to tic makes him changeable, capricious, lacking in will-power, and at times impulsive.

The chief clinical points of distinction between facial tic and spasm are these:

1. Spasm begins locally and spreads more or less gradually so as to involve progressively fiber after fiber, or fasciculus after fasciculus of the same muscle, and one muscle after another; usually it starts as a slight quivering at the free border of the lower eyelid, gradually affecting both eyelids, so that the eye is half-closed. The spasm may stop here, but it is more usual for it to invade progressively the whole of the muscles of one-half of the face; it disappears in the same way, often rapidly, but not suddenly. In tic the movement is completed at once; it appears and disappears with equal suddenness.

2. Even in the severest degree of facial spasm, when there appears to be a permanent contracture of all the muscles of one side of the face, the contracture is never quite uniform; here and there portions of some muscles are relaxed, while other portions are in a violent state of spasm; one or more muscles may be affected *en masse,* but in others there are only fibrillary or fascicular contractions. In tic all the fibers of the affected muscles are involved equally; or, if only a part of a muscle contracts, it is because it has a different function from the other parts.

3. In spasm the affected part of the face is devoid of every known form of emotional expression; the muscular contractions show no trace of coördination for a definite act—*e.g.,* mimetic, as is seen in tic. Tic essentially represents a functional act—exaggerated, often perverted or even new, but still characteristic.

4. In spasm the convulsive phenomena are limited strictly to the region supplied by the facial nerve, and are essentially unilateral; occasionally there are some contractions, more or less transient and inconstant, of the muscles of the eyelids, on the other side of the face. In tic, other muscles functionally associated with those of the face are commonly implicated—*e.g.*, in tic of the eyelids, affection of the muscles of the eyes and neck. Tic is often bilateral, and this is the rule in tic of the eyelids, the two sides normally functionating together.

5. The patient by an effort of the will and attention always can exercise a more or less prolonged restraining influence on tic. It is almost impossible to prevent or modify spasm. No effort on the patient's part, and no psychical influence in the majority of cases, has the slightest effect on the spasm.

6. The mental state of the patient is of primary importance in tic (*vide supra*); it plays little or no part in spasm.

7. Spasm may appear or go on during sleep; tic never does.

8. Spasm may be accompanied by sensory, vasomotor, or trophic signs.

The affection known as "tic-douloureux" of the face is not a tic, but a spasm.

In spasm the prognosis depends upon the cause. Unless this can be removed, spasm obstinately resists all forms of treatment so often that one is fortunate to get amelioration. In tic everything is subordinate to the mental state of the patient. With proper treatment recovery is the rule.

The treatment of tic is methodical exercise of the muscles involved. The patient should be taught to control the involuntary movements, and at the same time he must learn to execute, at command, regular, slow, methodical movements of the muscles involved. This should be done at first under the eye of the physician, but must be repeated by the patient at home several times a day. Meige strongly advocates performing these home exercises before a mirror. He believes that, if taken in hand at the beginning, tic can be almost prevented in children by a parent who will pay enough attention and exercise sufficient firmness, for the result of this treatment is especially good in young patients.

Reviews.

A Text-book of Nervous Diseases and Psychiatry. By Charles L. Dana, A.M., M.D. Sixth Edition, Revised and Enlarged.
New York: William Wood & Co., 1904.

This book, which is perhaps the most popular of all American works on neurology, has deservedly reached its sixth edition. The present edition differs materially from its predecessor. In the first place much more space is devoted to the subject of disorders of the mind, and while the author is frank in stating that it is impossible, in the amount of space used in a small volume, to adequately consider the various types of insanity and mental derangement, he has endeavored to present a fairly exhaustive consideration of this branch of neurological practice, devoting twelve chapters to its consideration at the close of the volume. That portion of the book which deals with diseases of the nervous system other than the mind has undergone little change. The only point which we think worthy of regret in connection with this book is the fact that the character of the illustrations, so far as their execution is concerned, does not keep pace with the excellent quality of the text. Some improvement is noted in this respect over previous editions, but there is still room for betterment. We have always been surprised that a book of this character, emanating from the large clinical experience of its author, contained so few original illustrations. But, on the other hand, it may be well said that those illustrations which are present are, as a rule, well selected.

We do not know of any book on nervous diseases which so clearly, concisely, and ably presents the entire subject so well as does that of Dr. Dana, and while it is true that in some instances he is dogmatic as to diagnosis and treatment, this perhaps is an advantage rather than a fault in view of the concentration of the text.

A Text-book of Human Physiology. By Albert P. Brubaker, A.M., M.D.
Philadelphia: P. Blakiston's Son & Co., 1904.

Dr. Brubaker is known to a large number of medical and dental graduates as an able teacher of human physiology, and students outside of the city of Philadel-

phia as well as in it are familiar with his name because of the successful Quiz-Compend upon this subject which he prepared twenty odd years ago, and which has since that time gone through many editions. The present volume is a very much more noteworthy one than the Quiz-Compend to which we have referred. It is supplied with colored plates and 354 illustrations, and endeavors to present the subject of physiology as exhaustively as it can be presented in a single volume of about seven hundred pages. Many of the illustrations which he employs are taken from other sources than his own physiological researches, and in several instances credit for the same is not given, an oversight which we presume will be corrected in other editions.

We naturally turn with interest to the chapter on the blood, since this fluid has been subjected to such careful and fruitful experimental investigation by Ehrlich and others within the last few years. We regret to find that the author has not described Dare's hemoglobinometer in preference to the instrument of Gowers, and that he has said nothing about the properties of blood serum in its ability to destroy bacteria and to combat toxins. While it may be held that these things deal rather with pathological than with physiological conditions, it seems to us that at this time these very important functions of the blood serum should not be ignored in a work on modern physiology. Criticisms of this kind, however, do not in any way indicate radical defects, but simply differences of opinions as to the relative importance of certain subjects.

To sum up our opinion of the book we may state that it affords the student and practitioner a first-rate guide in elementary physiology, and not only describes normal functions with accuracy, but also the apparatus which can be employed for ordinary physiological experimentation.

THE PRACTICE OF OBSTETRICS. By J. Clifton Edgar, M.D.
Philadelphia: P. Blakiston's Son & Co., 1904.

It is not a year since we had the pleasure of noticing the first edition of this very extraordinary work upon obstetrics by one of the most active practitioners and teachers of this department of medicine. At that time we referred to the work in the most complimentary phrases, and it is needless to say that the second edition of the book is, if possible, better than the first. It is one of the largest works, if not the largest, upon obstetrics yet prepared by a single author, and it contains no less than 1264 illustrations, with five colored plates and 38 figures printed in colors. Unlike many of these figures in other volumes, the colored plates are exceedingly well executed, and really show what they are designed to illustrate. We cannot conceive of a book which could be more useful to the general practitioner of obstetrics than this one. While individual practitioners may differ from the author in regard to certain of the methods which he advises, they will nevertheless admit that these points of difference are still under discussion. We happen to note on page 323 a typographical error in speaking of Dr. Wilmer Krusen as "William" Krusen.

We prophesy that the second edition of Dr. Edgar's work will be as rapidly exhausted and prove as popular as the first.

RADIOTHERAPY AND PHOTOTHERAPY. Their Medical and Surgical Applications in Diagnosis and Treatment. By Charles Warrenne Allen, M.D. With the coöperation of Milton Franklin, M.D., and Samuel Stern, M.D.
Philadelphia: Lea Brothers & Co., 1904.

The profession will welcome the appearance of this book if for no other reason than that it provides them with a succinct and accurate account of these new methods of diagnosis and treatment. While there are many other practitioners in this country who have employed these agents largely and have written about them, it is nevertheless advantageous to have placed before us not only the conclusions arrived at by other authors, but those obtained by Dr. Allen as well.

The first part of the book is devoted to general considerations of radiology, its history and character, the apparatus required, and the methods of administration. The second part deals with its employment in diagnosis; the third, with radiotherapy; the fourth, with light as a therapeutic agent; the fifth part, with actinotherapy; the sixth part with radioactivity; and the seventh with high-frequency currents. The book is copiously illustrated, not only with pictures of ap-

paratus but with diagrams illustrating its use, and, in its clinical portions, with pictures showing patients before and after treatment. It cannot be doubted that this method of treatment has come to stay in a certain number of cases. Exactly how valuable it will prove or how large a number of cases will be benefited by it in future is still undetermined. Dr. Allen's book helps the profession in general to the determination of this important question.

THE STUDENT'S HANDBOOK OF SURGICAL OPERATIONS. By Sir Frederick Treves, Bart., K.C.V.O., C.B., LL.D., F.R.C.S. New Edition.
Chicago: W. T. Keener & Co., 1904.

Even to those professional carvers of their fellow man who have habitually used Treves's admirable operative surgery, this condensation, designed mainly for the use of students, comes as a welcome and useful addition to the craftsman's library. There has long been need of a work of this kind designed for those who have the ordeal of examinations before them. There was little hope, however, that this need would be admirably filled by a master hand. The anatomy is dwelt upon briefly. Theoretical considerations are omitted entirely. The practical accomplishment of each operation is described with absolute lucidity. The book is quite certain to become extremely popular.

HANDBOOK OF SURGERY. By Frederic Richardson Griffith, M.D. 417 Illustrations.
Philadelphia, New York, London: W. B. Saunders & Co., 1904.

Griffith's work upon this subject is a monument of skill in condensation. In view of the many-volumed systems of surgery, it is astonishing to find embraced in about 550 pages surgical equipment, bandaging and minor surgery, preparation, anesthesia, operation, microscopic technique, bacteriology, wounds, special surgical diseases, pathology, medicolegal examinations, tumors, surgery of the bones, orthopedic surgery, surgery of the joints, operative surgery, surgery of the fascia, tendons, and muscles; of the circulatory system, the respiratory system, the nervous system, digestive organs, skin and lymphatic system, the genito-urinary system, the eye, and the ear.

The part devoted to the respiratory organs includes those affections often relegated to the specialist. The part pertaining to the digestive organs begins with harelip, and includes affections of the tonsils, finishing with the thyroid and thymus glands.

Each affection is taken up in a distinctly practical way, beginning with a definition, followed by etiology, symptoms, diagnosis, treatment, and prognosis.

As a matter of fact, considering the enormous ground covered by this work, it is extremely well done. The carping critic might find faults of omission were he rigorously to hunt for them, but an effort to duplicate the work would leave him astonished at how little of major importance has been left out.

REGIONAL MINOR SURGERY. By George Gray Van Schaick, M.D.
New York: International Journal of Surgery Co., 1904.

The promptness with which a discriminating profession has called for a second edition of this work is proof that the book is well worth while. The first edition was so recent and so satisfactory that revision would seem to have been unnecessary, yet the author has made every effort to avail himself of all serviceable suggestions occurring in current literature. The classification is regional, and the various procedures are clearly described. Also, with few exceptions, the choice of procedure is wise, and there is everywhere evidence that the teaching is based upon the wise experience of a common-sense surgeon.

MANUAL OF PERSONAL HYGIENE. By American Authors. Edited by Walter L. Pyle, A.M., M.D. Second Edition, Revised and Enlarged.
Philadelphia, New York, and London: W. B. Saunders & Co., 1904.

In the introduction to this work, the result of collaboration on the part of D. H. Bergey, M.D., J. W. Courtney, M.D., George Howard Fox, M.D., E. Fletcher Ingals, M.D., B. Alexander Randall, M.D., G. N. Stewart, M.D. (Edin.), Charles G. Stockton, M.D., it is stated that a striking example of the sacrifice of health from avoidable and preventable suffering is the great number of physical and moral wrecks, the victims of the very prevalent habit of worry. As a necessary sequence follows the advice that the surest way to restore health that is threatened is to keep the mind cheerful and hopeful.

Stockton, in writing of the hygiene of the digestive apparatus, seems to think that upon digestion depends the general physical condition. Excellent advice is given as to the relation between the quantity of the food taken and the amount of work performed. Proper cooking is insisted upon, and it is stated that a certain amount of water should always form a part of every meal, this being particularly necessary in those who have very active digestion. It is pointed out that women as a rule drink too little water. Alcohol is considered unnecessary, and caution is given against eating after vigorous exercise.

Fox, after a brief description of the function and physiology of the skin, devotes considerable time and attention to the question of bathing. He notes that a good soap cannot be made very cheaply, and that medicated soaps are of little use. He observes that any toilet soap upon the market may be used with impunity by the majority of people. He calls attention to what is called bath pruritus, and gives certain directions in regard to care of the complexion. The clothing is sensibly discussed, including shoes, socks, and corsets. Directions are given for the care of the hair. There is a very useful discussion concerning the use of hair restorers.

Ingals contributes an interesting chapter on the hygiene of the vocal and respiratory apparatus. He inveighs against the dry air of houses in winter, and he would prevent children from picking the nose by rubbing a few drops of vaselin into the nostrils. The care and training of the voice in children is very sensibly discussed, as are also prevention of spinal deformities, shoulder-braces, the purity of the air inhaled, and the general principles of climate.

The hygiene of the ear is treated by Randall, who states that wax does not collect in a healthy ear, and cautions against the use of scoops or mops. He also solemnly warns against the custom of a preliminary softening of a plug of wax by putting oil or other fluids into the ear. Careful syringing with hot water is the only proper procedure for removing wax.

The eye is considered in a most instructive manner by Pyle. After a brief discussion of the importance of the eye, he takes up such subjects as eye-strain, visual tests, general care of the eyes, and school hygiene, spectacles and eye-glasses.

The hygiene of the brain and nervous systems is considered by Courtney. He discusses puberty and its attendant dangers, abuse of alcohol, overwork, and need of mental recreation, sleep, and insomnia.

Stewart contributes a chapter on physical exercise, extremely sensible and directly to the point.

Bergey takes up domestic hygiene, beginning with the consideration of furnishing of dwellings, ventilation, heating, light and water-supply, plumbing and drainage, the disposal of garbage, ashes, and nuisances; house cleaning, food and dietetics, and causes and transmission of disease.

A very useful appendix considers pulse, temperature, and respiration, baths, massage, accidents and emergencies, poisoning and antidotes.

The book is contributed by men thoroughly versed in the subjects they discuss, and is so full of useful information put in a reliable and practical way that it can be cordially commended for general consumption.

Correspondence.

PARIS LETTER.

By R. H. Turner, M.D. (Paris).

At a recent meeting of the Academy of Medicine Dr. Lucas-Championnière, a well known surgeon of the Paris hospitals, made some interesting remarks on the causes of appendicitis and its prevention. This disease used to be infrequent, but it is seen much more frequently since we have had epidemics of influenza, and in certain countries like Australia it has only been observed with any degree of frequency since this period. Another important factor is the regimen, the vegetarian diet being a preventive, as is seen in Porto Rico, where the natives, who live on vegetables, show very few cases, while the Americans are subject to it. In Roumania there is one case in 22,000 vegetarians, and one case in 221 carnivorous inhabitants. The same holds true in Belgium,

Algeria, Tonquin, and New Caledonia. In the French prisons, where the food consists mostly of vegetables, there is very little appendicitis—one case at Clairvaux since 1900; at La Roquette two or three very slight cases, easily cured by a few days' treatment. Amongst nuns, who live on a few vegetables, there is also no appendicitis.

At this same meeting Professor Reclus, the best known advocate of anesthesia by cocaine, read a communication on the use of stovaine, a new local anesthetic discovered by a French chemist, Fourneau. It seems that this new drug acts just as well as cocaine, it having been used in Reclus's wards, and the latter preferring it to cocaine. Stovaine is only half as dangerous as cocaine, when tried on animals, and so far Dr. Reclus has found that its use is rarely followed by the symptoms seen after the use of cocaine, such as pallor and distress. Speaking of the operations in which it can be used, Dr. Reclus mentions such cases as those offered by lipomas, fibromas, small cancers of the skin, removal of the fingers, ingrowing toe-nails, felons, abscesses, gastrostomy; umbilical, inguinal, or crural herniæ; and dilatation, hydrocele, laparotomies for non-adherent cysts of the ovary, or tuberculous peritonitis; empyema with or without excision of a portion of rib. In his service two-thirds of the operations are done by means of stovaine. Stovaine causes vasodilatation, so that there is slight hemorrhage. But this will perhaps allow of patients being operated on while they are seated. So far Dr. Reclus does not dare to affirm this.

The well known dermatologist, Dr. Sabourand, of the St. Louis Hospital, reported at a meeting of the Society of Dermatology the results he had obtained in the treatment of tinea capitis. He had obtained 134 cures at the hospital, and treated 251 children who did not live at the hospital. The number of beds had been reduced. The treatment consists in the use of *x*-rays. Out of 2200 applications, there have only been six cases of radiodermatitis and eleven simple cases of erythrodermia. A new screen in platinocyanide of barium is used, which indicates how long the treatment should be continued, and which is usually eight minutes. This period of time is indicated by the color of the screen.

Dr. Alfred Martinet has recently written an article in the *Presse Médicale* on the choice of an acid in the treatment of gastric troubles. Professor Robin recommends the following mixture:

> Pure sulphuric acid, 2 grammes 40 centigrammes;
> Nitric acid, 80 centigrammes;
> Alcohol at 80°, 18 grammes.

This preparation should be left by itself for forty-eight hours, and then the following should be added to it:

> Syrup of lemons, 100 grammes;
> Aqua fontis, 150 grammes. .
>
> F. s. a. One to three soupspoonfuls every day after meals in some water or wine and water.

Dr. Martinet, however, considers that phosphoric acid is even better than this or hydrochloric acid, as it does not have any effect on the secretions of the stomach. It is neutralized in the intestine and produces phosphate of soda. Hydrochloric acid on the contrary inhibits the secretion of gastric juice when it is found in too large quantities in the stomach, as shown by Pawloff. This phosphate of soda is a normal body in the urine, and being acid helps to render the urine aseptic, and is of benefit in catarrh of the bladder. Lastly, it has a tonic effect on the nervous system, and in dyspepsia complicated so frequently with nervous debility it has an excellent effect. The following formula is recommended by Dr. Martinet:

> Phosphoric acid (official), 10 grammes;
> Acid phosphate of sodium, 20 grammes;
> Distilled water, 200 grammes.
>
> One to four teaspoonfuls (according to indications and tolerance) in a glass of water or wine and water during the meal.

This treatment can be continued quite a length of time, according to the experiments of Cantur and Joubè.

Dr. Widal is continuing his interesting work on the chlorides, and at a meeting of the Society of Biology he remarked that he had found that the cure of dechlorination, as it is called, had an influence on the quantity of albumin excreted in various forms of albuminuria. Meat can be given without increasing the quantity of albumin, provided salt is carefully given.

At a meeting of the Academy of

Sciences a communication was read by Dr. Bordas, who had been investigating the quantity of arsenic contained in certain pharmaceutical products, which have been torrefied with coal containing a certain amount of arsenic. Glycerin was found to contain as much as nine-tenths of a milligramme per kilogramme. Certain pharmaceutical products, such as the glycerophosphates, would contain as much as two-tenths of a milligramme. It should, moreover, be remembered that these bodies are administered to children.

Dr. Lucas-Championnière made some remarks recently at the Academy of Medicine which are certainly quite startling by their being so radically opposed to what is generally taught as to the treatment of phlebitis and varicose veins. Already in 1878 Dr. Championnière, who was then surgeon of the Cochin Maternity, did not have women suffering from phlebitis kept immovable. He favored Dr. Dugron's treatment of phlebitis, which consists in gentle and progressive massage. He also recommended Dr. Marchais's treatment for varicose veins, the chief element of which is rapid walking. Elastic stockings are forbidden. The patient can also carry out exercises while lying down. Drs. Raymond and Zimmern have also studied the influence of radium on the pains seen in locomotor ataxia, and the results seem to have been excellent after a few applications of this remedy.

At a recent meeting of the Society of Surgery a long discussion took place on the beneficial influence of laparotomy in certain affections of the liver where no radical intervention could be carried out. Dr. Faure described a case reported by Dr. Denis, of Constantinople, where the patient, a sailor, was thought to be suffering from suppurative hepatitis. On performing laparotomy the liver was found very large, and was punctured repeatedly without any pus being found. This operation proved most beneficial, however. Dr. Lejars related a case in which, on account of the serious symptoms shown by a woman—loss of flesh, jaundice, very large liver, appearance of a tumor near the biliary vesicle—he operated and found a neoplasm of a greenish-yellow color in the substance of the liver. Failing to remove it, he decided to leave it, and the patient made an uneventful recovery. Ten years ago this woman, who had never admitted any symptoms of syphilitic nature, presented a tumor on the left tibia which disappeared after a syphilitic treatment. It may be that the tumor was of syphilitic origin. Dr. Reymer, Dr. Tuffier, and Dr. Hartmann described similar cases in which an operation was performed for infection or presumed cysts, and though nothing more than a laparotomy was performed the patient recovered completely. This would seem to be similar to the results of Edebohls's operation in chronic nephritis.

THE USE OF RADIUM.

To the Editor of the THERAPEUTIC GAZETTE.

SIR: I am sending you two pictures which I believe will be of interest to you and the readers of the GAZETTE. I believe they are the first of the kind taken in this country.

The radium used is a half of a grain of one million activity.

The time of exposure of the water used to the radium was twenty-four hours.

The time of exposure of the plate and

scissors to the water, "which was in a bottle suspended about 4 inches above plate," was sixty-four hours.

The time of exposure of plate and scissors to the radium was sixteen hours, just one-quarter of the time necessary for the water; thus showing that the water

thus prepared is one-fourth as active as the radium.

The clearest plate is the result of the radium, the other the radioactive water.

Yours fraternally,

G. A. SMALE, M.D.

St. Charles, Michigan.

APOCYNUM CANNABINUM VS. ANDROSÆMIFOLIUM.

To the Editor of the THERAPEUTIC GAZETTE.

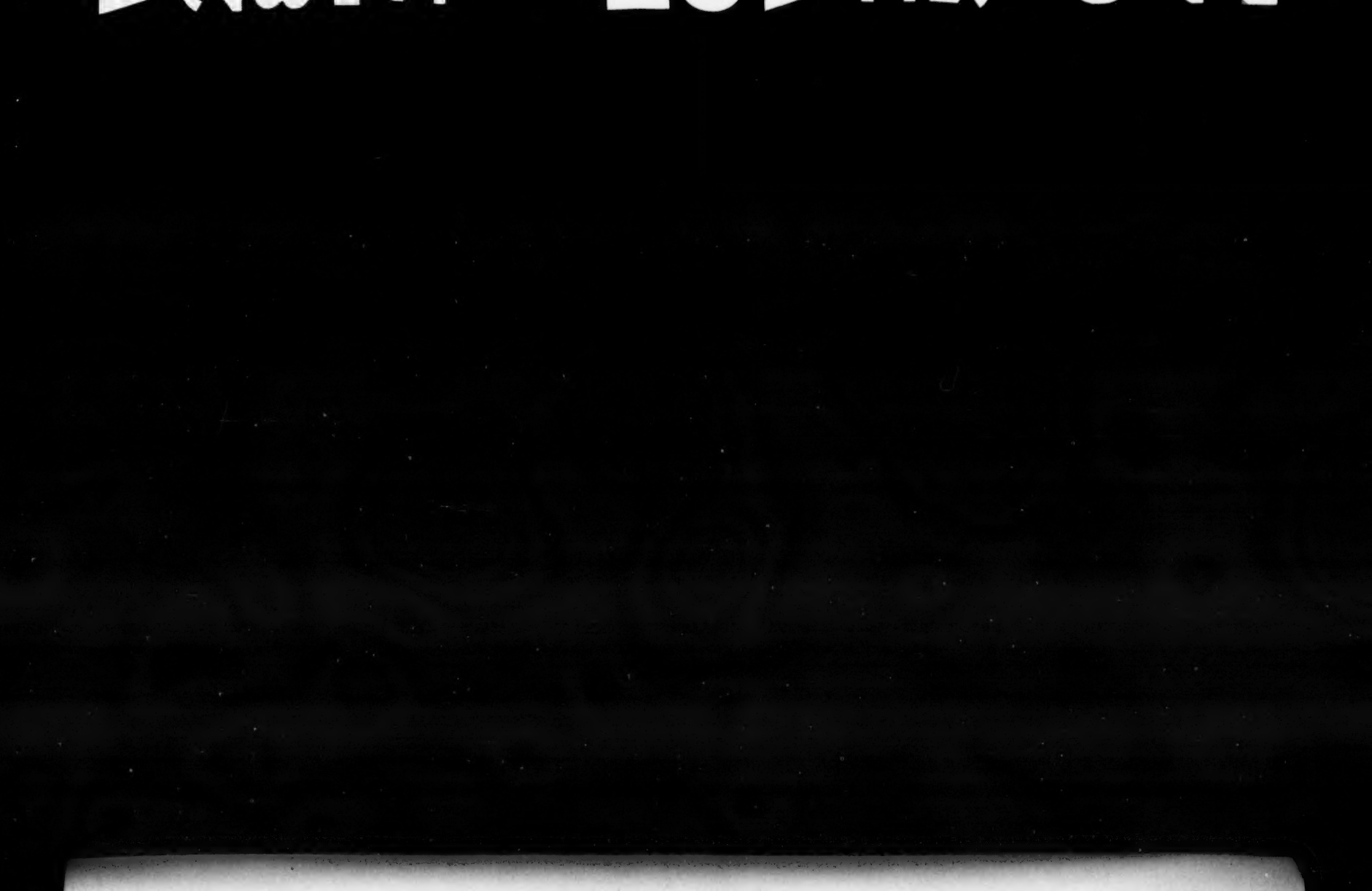
SIR: In the August number of the GAZETTE appears an editorial estimate of the value of *Apocynum Cannabinum*, which is most discriminating and satisfactory, and assigns to that not too well known drug a very important place in the physician's armamentarium. It throws light on a rather obscure subject, viz., the scope and field of this potent article.

But it is not so much because of what was said of this drug as because of what was said comparatively of a relative in the same order, viz., *Apocynum Androsæmifolium*, with which it has been confounded, with consequent disappointment, that I write. That there should be difficulty in making a distinction between the two plants is not very strange, as there is quite a strong resemblance between them, and besides, they are found growing side by side in the same places, and are of about the same height and general appearance. It would seem, however, that any one assuming the function of collector of valuable medicinal plants ought to be botanist enough to distinguish between them. The substitution of the androsæmifolium for the cannabinum would naturally produce disappointment, as the therapeutic virtues of the two drugs are quite diverse from each other, although the former is possessed of equally valuable virtues.

As the therapeutic energies of the cannabinum are expended largely upon the heart and kidneys, the other variety expends its influence largely upon the hepatic apparatus, including the liver itself, as well as the gall-bladder and ducts, etc.; also extending its influence to the mucous coat of the bowels and stomach. In malarial conditions with torpid liver, in jaundice, in all cases where there is a sallow, yellowish skin, with foul tongue and clay-colored feces, it has a peculiarly happy effect. In fact, in all so-called bilious conditions it is almost a specific. It unlocks the secretions of the liver, secures a free discharge of bile, and becomes, if pushed, an efficient cathartic, although it is primarily an ideal cholagogue.

It is a most efficient aid to the administration of quinine in all malarial conditions, and in remittent and intermittent fevers.

Much more might be said of the valuable uses to which this article might be put, but I simply wish to enter a plea for the drug, which deserves more recognition, in its own behalf, and not merely as one which gets in the way and is confounded with its congener, to which it is or might be a valuable ally. I recommend it to the profession as a most valuable aid to the restoration of the delayed or faulty operations of the liver and general hepatic apparatus.

GEO. S. CHALMERS, M.D.

Galesburg, Illinois.